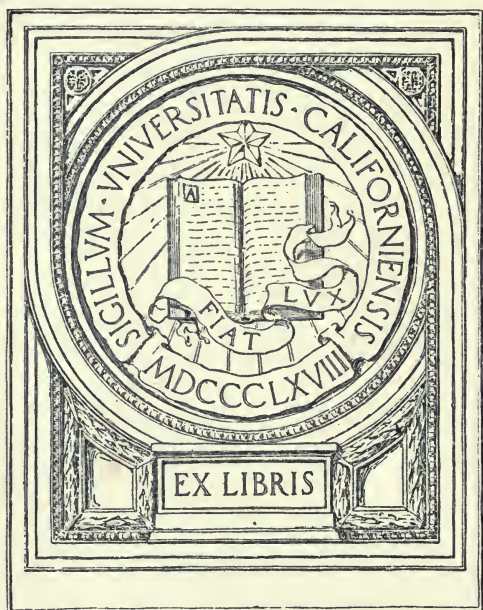




BRETT'S
NEW ZEALAND
AND
SOUTH PACIFIC
PILOT.

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West Coast Frontier Survey
San Francisco Cal

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Bretts

New Zealand and South Pacific Pilot

Nautical Almanac

for 1881-2-3.

PUBLISHER'S PREFACE.

IN issuing a book Almanac annually, the Publisher became aware of the want of a thoroughly revised Pilot for New Zealand and the South Seas. The last edition of the "New Zealand Pilot" was published in 1875. Since then, extensive harbour works have been carried out and new dangers discovered on the coast.

To prepare a work of this character, however, so as to make it of any value to mariners, it must be undertaken by a first-class navigator, and carried out with a care and at a length that is impossible in any ordinary Almanac. The Publisher, therefore, was highly gratified upon finding that Capt. TILLY, Examining Officer for Masters' and Mates' certificates under the New Zealand Government, and whose surveying work in the South Seas is well-known in Admiralty works, would be prepared to carry out the revision. The care and attention which Capt. TILLY has bestowed on the work, not only in its preparation, but in revising every line afterwards before permitting the sheets to go to press, is worthy of all praise. Capt. TILLY has produced a book of colonial importance—one that might properly have occupied the attention of the New Zealand Government.

To make the work a complete text-book for mariners sailing from New Zealand ports, the nautical information from the English Official Nautical Almanacs for 1881, 1882, 1883 has been embodied. This has undergone a very careful revision, and may be accepted as thoroughly reliable.

The whole book is offered at a lower price than is charged at the Customs for the "New Zealand Pilot."

Some information with reference to the South Sea Islands, which it might have been desirable to include, has been omitted, but it is the intention of the Publisher, should public appreciation warrant, to issue supplements embodying new and additional information as required.

HENRY BRETT,
PUBLISHER.

Auckland VK929
New Zealand . B7

58.

ELLINOR C. DAVIDSON ESTATE
DECEMBER 1945



Professor George Davidson
U.S. Coast & Geodetic Survey

EDITOR'S PREFACE.

With the respectful acknowledgments of
Alex. W. Kelly

THE object of this work is to give, in as short a compass as is compatible with accurate information and intelligent description, sailing directions for the coast of New Zealand, the Pacific Islands, with which our trade is chiefly connected, and one or two of the principal ports in Australia and Tasmania.

The tables of positions, and of courses and distances, will, it is hoped prove useful; with regard to the former it should be borne in mind that the state of hydrography is still such in some of these regions, that many discrepancies still exist, and many dangers marked 'doubtful,' still remain so. The introductory chapter is meant to convey a general impression of the resources of the different parts of New Zealand to any one looking out for a port, for a cargo.

The works mainly followed are the latest editions of the 'New Zealand Pilot,' and Findlay's 'North and South Pacific Directories,' combined with all the latest alterations, and hydrographical knowledge.

A very brief notice of winds, hurricanes, and currents, is all that the size of the work permits.

The table of Declinations, etc., at the end, will be found useful to those who may not have a Nautical Almanac; rendering them in fact independent of one, for their island voyages.

The Editor avails himself of this opportunity for stating that he has received most ready and cordial assistance from every one to whom he has applied for information; and that, wherever practicable, the name of the contributor has been inserted, both as a suitable means of recognition, and as a guarantee for accuracy. One gentleman—whose name does not otherwise appear, must be mentioned here—Capt. I. J. BURGESS, Chief Harbour Master, who was actively engaged in the first survey of New Zealand, over thirty years ago, and who has now fittingly supervised this last attempt; to his care and practical knowledge, is due whatever merits this work may possess of accurate technical arrangement.

With a view to render a future edition (should one be required) more valuable, the Editor will thankfully receive all further information that may be entrusted to him.

T. C. TILLY,
Navg.-Lieut., R.N.

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The first part of the document
 discusses the general principles
 of the system and the
 various methods of
 application. It is
 divided into several
 sections, each dealing
 with a different aspect
 of the subject. The
 first section is
 devoted to the
 theory of the
 system, and the
 second to the
 practical details
 of its use. The
 third section
 contains a list of
 the various
 instruments and
 materials required
 for the work, and
 the fourth section
 describes the
 various operations
 which are to be
 performed. The
 fifth section
 contains a list of
 the various
 diseases to which
 the system is
 applicable, and
 the sixth section
 describes the
 various methods
 of treatment
 which are to be
 employed. The
 seventh section
 contains a list of
 the various
 cases which have
 been treated by
 the system, and
 the eighth section
 describes the
 various results
 which have been
 obtained. The
 ninth section
 contains a list of
 the various
 objections which
 have been made
 to the system, and
 the tenth section
 describes the
 various reasons
 which have led
 to its adoption.

C. Depe. W. Kelly
San Francisco 1881

BRET T'S

NEW ZEALAND AND SOUTH PACIFIC

P I L O T.

The information contained in these preliminary chapters will not—for the sake of brevity—be repeated in the Sailing Directions; the reader is therefore requested to refer to them as occasion requires.

TABLE OF POSITIONS.

New Zealand.

Name of Place.	Lat. South	Long. East.	Tides.	
			H. W. F. & C.	Rise.
North Island.				
Three Kings island, N.E. island, N.E. extreme	34 6	172 10	h. m.	feet.
" " " " S.W. island, West extreme	34 10	172 2	8 0	7 springs
Cape Maria Van Diemen, Cape islet	34 29	172 39	8 0	7 "
North cape, Cape islet	34 25	173 5	7 0	7 "
Parenga-renga harbour, Kohau or Coal point	34 31	173 2	7 54	7 "
Cape Kara Kara, Cape extreme	34 47	173 25		
Monganui harbour, White's point	35 0	173 34	8 15	7-6
Stephenson island, N.W. extreme	34 58	173 48		
Wangaroa harbour, Peach island	35 2	173 47	8 15	7 springs
Cavalli islands, Great island, N.E. extreme	34 59	173 59	8 0	7 "
Bay of islands, Motu Mea islet	35 17	174 7	7 15	6-9 "
" " Cape Brett (Percy island)	35 10	174 21		
Wangaruru harbour, Grove point	35 24	174 22	7 10	7-9
Poor Knights island, North island, North point	35 29	174 45		
Tutukaka harbour, North head	35 38	174 34	7 0	7-9
Bream head, extreme	35 52	174 37		
Wangari harbour, Lort point	35 51	174 32	7 0	7-9
Moko-Hinou islands, North-West islet	35 55	175 5		
Great Barrier island, Aiguilles, or Needles point	36 1	175 26		
" " " " Nagle cove	36 9	175 21	6 25	7-10
" " " " Cape Barrier, extreme	36 22	175 33		
Rodney point, extreme	36 17	174 51		
Kawau island, Bon Accord harbour, Momono jetty	36 26	174 50	6 30	7-10
Auckland harbour, Depot point	36 50	174 49	7 5	9-11
Coromandel harbour, Tuhua island	36 49	175 26	7 0	
Cape Colville, North point	36 28	175 22		
Cuvier island, highest peak	36 26	175 48		
Mercury islands, East island (<i>Wakahau</i>), North cliff	36 36	175 58		
Mercury bay, Huki-huki pah, entrance of Mangrove river	36 49	175 45	7 21	5-7
Alderman islands, East island	36 56	176 8		
Kati-Kati river, North head	37 27	176 1		
Mayor island, highest peak (410 feet)	37 16	176 15	7 45	
Tauranga harbour, Monganui Mt. (apex 860 feet)	37 37	176 11	7 10	4½-6
Astrolabe reef, Centre (dries 4 feet L.W.)	37 31	176 27	7 30	
Motiti island, North point	37 35	176 26		
Maketu, Town point	37 43	176 29		
Whale I. or Motu Hora, highest peak (1,167 feet)	37 50	176 59		
Opotiki river, Mission house	37 58	177 18	7 0	7 springs
White island Summit (863 feet)	37 30	177 12	7 30	
'Te Kaha point, Outer extreme	37 43	177 42	6 30	9 "
Runaway cape, extreme	37 31	178 1	9 16	7 "
Hick's bay, Motakawa, or Long point	37 32	178 21	9 0	7 "
East cape, East cape islet (420 feet)	37 40	178 36	8 55	7 "
Open bay, North point	37 58	178 23		
Tolago bay, Motu-Heka islet	38 21	178 21	8 50	
Gable-end Foreland, the White Gable	38 32	178 18	8 0	
Ariel rocks, Centre of reef	38 44	178 19	8 0	
Poverty bay, Young Nick's head	38 45	177 59	6 5	5-7
Mahia peninsula Table cape (extreme)	39 6	178 1		

Name of Place.	Lat. South.	Long. East.	Tides.	
			H. W. F. & C.	Rise.
Mahia peninsula, Portland island, S'thern extreme	39 18	177 53	h. m.	feet.
Hawke's bay, Ahuriri harbour, Maori pa	39 29	176 55	7 45	3 springs
" " Long point anchorage, Moemoto head	39 8	177 51	6 0	5-4
Cape Kidnappers, extreme	39 38	177 8		
Cape Turnagain, East extreme	40 29	176 40	7 0	
Castle point, extreme	40 55	176 14		
Flat point, extreme	41 15	175 58		
Cape Palliser, extreme	41 37	175 17	6 0	
Taurakira head, extreme	41 26	174 56		
Port Nicholson, Pencarrow light	41 22	174 52		
" " Observatory	41 17	174 47	4 30	2-5
Cape Terawiti, extreme	41 17	174 38		
Mana island, Anchorage point	41 6	174 48	7 0	6-8
Kapiti island, Long point	40 50	174 58		
" " Maynew islet	40 54	174 55	9 0	6 springs
Manawatu river, North entrance point	40 27	175 15	10 0	6-8
Rangitiki river, North entrance	40 18	175 15		
Wanganui river, North head	39 57	175 1	10 15	6-8
Waimate pa, summit	39 36	174 10		
Cape Egmont, extreme	39 17	173 46	9 30	
Mount Egmont, summit (8,270 feet)	39 18	174 5		
New Plymouth, Flagstaff	39 4	174 5	9 30	9..12
Mokau river, entrance	38 43	174 39		
Albatross point, North extreme	38 6	174 43		
Kawhia harbour, South head	38 5	174 49	9 30	12 springs
Gannet island, summit (80 feet)	37 57	174 35		
Aotea harbour, South head	37 59	174 51	10 0	12-94
Whaingaroa harbour, South entrance point	37 47	174 53	9 50	12-94
Waikato river, Maraiti village	37 24	174 47	9 30	9-12
Manukau harbour, Paratutai (North head) flagstaff	37 3	174 42	9 30	10-13
" " Onehunga (South point)	36 56	174 38	10 50	9-14
Kaipara harbour, South head (Okaka)	36 25	174 15	10 55	8-10
" " North entrance head	36 24	174 7		
" " Watering place, Wairoa branch	36 20	174 12	10 50	8-11
Monganui bluff, the Bluff (2,046 feet)	35 46	173 35	9 45	
Hokianga river, flagstaff at entrance	35 32	173 23	9 45	10 springs
" " Upper Mission station	35 22	173 33	9 58	
Wangape, North head	35 22	173 14	9 0	
Herekino, South point	35 18	173 11	9 0	
Reef point, extreme	35 11	173 5	8 45	"
Middle Island.				
Cape Campbell, extreme of cape	41 43	174 18	6 0	
Waipapa point, extreme	42 10	173 58		
Kaikoura peninsula, East head	42 26	173 44	5 0	4-6
Amuri bluff, extreme of bluff	42 34	173 32		
Waiau river, entrance	42 47	173 23		
Sail rock, centre	42 58	173 14		
Pegasus bay, Motunau or Table island	43 4	174 6	4 0	
" " Double Corner (landing place)	43 8	172 50		
Port Cooper or Victoria, Lyttelton Custom-House	43 37	172 44	4 20	4-74
Pigeon bay, settlement cove	43 41	172 54		
Bank's peninsula, East head	43 46	173 9	3 45	
Akaroa harbour, Observation head	43 50	172 58	3 24	6-8
Hakateru, or Ashburton river, North entrance point	44 5	171 49		
Timaru, flagstaff, landing place	44 23	171 17		
Waihao river, entrance	44 47	171 13		
Waitangi river, North entrance head	44 55	171 12		
Cape Wan brow, extreme cape	45 7	171 1		
Moerangi bay, Look-out bluff	45 16	170 54		
" " Whaler's Home point	45 22	170 54	3 0	
Waikouaiti bay, Jones' head	45 37	170 43		
Otago harbour, Tairua head	45 47	170 45	2 50	5-7
" " Koputai bay, South point	45 49	170 39	3 30	
Cape Saunders, extreme of cape	45 53	170 46	2 45	
Taiari island, East point	46 4	170 15		
Quoin point, extreme	46 9	170 13		
Molyneux bay, landing place	46 24	169 49	3 0	6-8
Nugget point, extreme of rocks	46 27	169 51		
Long point, extreme of cliffs (275 feet)	46 35	169 36		
Chaslunds Mistake, extreme of point	46 39	169 21		
Brothers point, outer islet	46 40	169 14		
Slope point, extreme	46 41	169 2		
Tuapuke island, observation bluff (N.E. head)	46 47	168 34	1 0	6-8
Awarua, or Bluff harbour, point near anchorage	46 36	168 22	1 18	6-8
New River (Oreote), Bombay rock	46 31	168 18	12 10	4-8
Centre island, South end	46 29	167 53	12 15	
Tewaewae bay, Pahia point	46 21	167 43		
" " Mid-bay reef	46 17	167 29		
" " Sandhill point	46 16	167 22		

Name of Place.	Lat. South.	Long. East.	Tides.	
			H. W. F. & C.	Rise.
			h. m.	feet.
Solander island, summit (1,100 feet)	46 36	166 55		
Green islets, outer islet	46 15	166 49		
Windsor point, extreme	46 13	166 40		
Preservation inlet, Cuttle cove	46 4	166 41	11 20	4-8
Chalky inlet, North port, Little island	45 59	166 36	11 5	4-8
Cape Providence, extreme	46 1	166 28	11 15	
West cape, extreme	45 54	166 26		
Dusky bay, or sound, Five Fingers point	45 44	166 23	11 15	6-10
" " Duck cove, observation rock	45 44	166 40	10 50	6-10
Break sea island, North east point	45 35	166 39	11 15	8
Daggs' sound, Observatory head, North arm	45 23	166 52	11 30	6-8
Doubtful inlet, Febrero point	45 17	166 50		
Thompson sound, Deas cove	45 12	166 58	11 30	6-8
Nancy sound, Heel cove, First reach	45 11	167 6		
Caswell sound, Green Point islet	45 2	167 13		
George sound, Anchorage cove, on the north shore	44 55	167 27		
Bligh sound, Bounty cove	44 53	167 32	10 45	6-8
Milford sound, Anita bay	44 35	167 47		
" " Freshwater basin	44 40	167 56	11 15	6-8
Awarua river, entrance	44 18	168 4		
		by chart.		
Cascade point, north extreme	44 0	168 22		
Jackson bay, huts in S.W. corner	43 50	168 38		
Open-Bay islets, S.W. islet, centre	43 52	168 54		
Arnot point, extreme	43 45	169 10		
Bruce bay, anchorage	43 36	169 37		
Mount Cook, highest peak (13,200)	43 36	170 12		
Okarito, lagoon and river	43 14	170 11	11 40	9
Abut head, extreme	43 7	170 17		
Bold head, extreme	42 58	170 41		
Hokitika, entrance	42 45	170 57	9 39	8-9
Grey river, entrance	42 28	171 11	10 15	
Perpendicular point, centre cliff	42 8	171 19		
Cape Foulwind, extreme	41 45	171 34	11 15	6-8
" " Three steeples (northern)	41 43	171 35		
Buller river (<i>Kawatira</i>), entrance	41 46	171 45		
Rocks' point, extreme	40 58	172 6		
Wanganui inlet, entrance	40 35	172 33	9 20	7
Cape Farewell, extreme	40 30	172 42	9 0	10-14
Farewell spit, Bush end, extreme of spit	40 33	173 2		
Massacre bay, Tasman corner, Abel head	40 32	172 45	8 45	9-13
" " Motu Pipi river, west entrance	40 50	172 52	9 50	10-14
Astrolabe road, Adele island, N.E. point	40 59	173 5	9 10	14-10
Nelson haven, Magazine on Boulder bank	41 16	173 17	9 50	10-14
Croisilles harbour, Shingle point on N. shore	41 3	173 43	9 0	12-8
Current basin, Sandy bay, Cross point	40 56	173 52	10 0	5-12
Stephens island, North end	40 40	174 1		
D'Urville island, Port Hardy: East arm, Wooding point	40 47	173 55	9 55	12
D'Urville island, Beach, Rangitoto road	40 48	173 58		
Pelorus sound, Sentinel rock, off entrance	40 53	174 10	9 35	7-11
" " Ohingaroa bay-beach	41 14	173 52	10 0	7-11
" " Kopi bay, central head, on south side	40 55	173 58	9 35	
Guards bay, Titirangi bay, cliff at head	41 1	174 9		
Cape Lambert, extreme	40 59	174 15		
Port Gore, Head of Melville cove	41 2	174 12	9 0	6-8
Cape Jackson, extreme	41 0	174 20		
Queen Charlotte sound, Motuara, South summit	41 6	174 17	8 50	6-8
Tory channel, White rocks, Jackson's bay	41 13	174 18	8 15	6-8
Brothers islets, North islet (235 feet)	41 6	174 27		
Wellington head summit (2,190 feet)	41 11	174 23		
Port Underwood, Bell's cove, Flag point	41 20	174 9	6 10	6-8
Wairau river, entrance, north side	41 30	174 5	6 0	4-6
White bluff, summit of north extreme (890 feet)	41 33	174 10		
South, or Stewart Island.				
Black Rock point, extreme	46 41	167 54		
Port William, Howell's house	46 50	168 6	12 45	6-8
Paterson's inlet, Glory cove	46 58	168 11	1 10	6-8
Port Adventure, White beach, South end	47 4	168 12	12 20	6-8
Lord's river, First cove within entrance	47 7	168 10	1 20	
Port Pegasus, Cove abreast Anchorage island	47 12	167 42	11 50	6-8
S.W. cape, S.W. extreme, Stewart's island	47 17	167 30	12 0	7 springs
Traps rocks, North reef, N.W. rock (5 ft.)	47 22	167 55		
" " South reef, centre	47 33	167 53	12 0	
Wedge island, centre	47 13	167 21	12 0	
Mason bay, North Ernest island, South cove	46 57	167 42	11 10	6-8
Codfish island, N.W. extreme, high rocks	46 46	167 38		
Snares Island.				
Snares Islands, S.W. island	48 7	166 29		

Name of Place.	Lat.	Long.	Tides.	
			H. W. F. & C.	Rise.
Chatham Islands.				
Ware-kauri, Point Allison	43 47 S	177 7 W	h. m.	feet.
Wangaroa bay	43 49	176 53	} Very irregular, once in 24 hours.	} About 6
Waitangi harbour, village	43 58	176 32		
Waka Kaiwa Hills	44 6	176 48		
Cape Eveque, or Beaufort	44 7	176 49		
Cape Young	43 41	176 47		
Rangi Tutahi, or Two Sisters I.	43 33	177 0		
Western reef, West point	43 55	177 13		
Sentry point, or Solitaire reef	44 12	176 47		
Pitt island, or Rangi Haute, South point	44 15	176 50		
Star Quay reef	44 12	176 8		
Bertier rock	43 54	176 12		

South Sea Islands.

Islands, etc., between 20 and 40 deg. South.				
Opara, or Rapa island	27 36	144 17	12 15	2½
Nielson reef	27 0	146 17		
Bass islet	27 56	143 28		
Taibai, or Austral Islands.				
Vavitaio island, or Ravaivai	23 42	147 50		
Tubuai island, North end	23 22	149 36		
Rurutu, or Oheteroah (1,300 feet)	22 29	151 20		3
Rimitera island (300 feet)	22 45	152 55		
Sands, or Hull islands	21 47	154 51		
Cook's Islands.				
Mangaia, or Mangea	21 57	158 7		
Rarotonga, North end	21 15	159 44		
Atui, or Wateco centre	15 58	158 4		
Tukutea, or Wenoaoctte	19 51	158 16		
Mitiero, centre	19 50	157 34		
Mauki, or Parry's Island	20 7	157 11		
Hervey Islands	19 18	158 54		
Aitutake, or Whytootake	18 52	159 41		
Palmerston island	18 6	163 10		
New island (doubtful existence)	24 20	150 30		
Haymet rocks	27 11	160 13		
Orne bank (16 fathoms)	27 40	157 45		
Beveridge reef, Lagoon reef, King George reef,				
Middleton reef	20 2	167 49		
Haraus reef (?)	21 32	168 54		
Thompson reef (?)	22 47	171 48		
Tonga, or Friendly Islands.				
Eoa, or Middleburgh, N.W. part	21 20	174 52		
Catto island	21 30	175 1		
Tonga-tabu Panghaimotu island	21 8	175 14		
North Star reef	20 50	174 35	6 50	6
Namuka (Anamooka) island	20 15	174 50		
Culebras Bank (?)	20 19	175 24		
Hapai islands, Lifuka	19 48	175 8		
Tofoa island, 2,800 feet	19 45	175 3		
Kao island, 5,000 feet	19 42	175 0		
Disney shoal	19 15	173 40		
Home shoal	19 4	174 50		
Vavau, Port Refuge, Neafu village	18 38	173 55	6 20	5
Latte, or Lette, island, 1,600 feet	18 45	174 40		
Amargura, or Fanoualei, or Gardners island	18 2	174 16		
Pylstaart island (Sola island)	22 25	176 2		
Pelorus reef	22 52	176 28		
Calinon reef	20 21	179 24		
Ono islands; peak large one	20 39	178 44		
Berghis reef, W. end	20 45	178 54		
Simonoff island	21 3	178 50		
Michaeloff	21 0	178 45		
Minerva reefs (S. reef)	23 56	179 5	8 0	6
(N. reef)	23 37	178 50		
Acoumanes reef	19 18	174 15		
La Rance Bank, 3½ feet	24 18	176 1		
Kermadec Islands.				
Raoul, or Sunday island, W. bay	29 15	177 55	6 0	5
Macaulay island, 750 feet	30 16	178 32		
Curtis island	30 36	178 37		

Name of Place.	Lat.	Long.	Tides.	
			H. W. F.&C.	Rise.
			h. m.	feet.
L'Esperance, Brinds, or French rock	31 25	178 55		
Havre rock	31 18	179 0		
Somme shoal	30 57	178 5 E		
Conway reef	21 40	174 40		
Matthew island, 455 feet	22 20	171 20		
Hunter island	22 24	172 5		
La Brillante shoal	23 12	170 4		
Walpole island	22 38	168 57		
Durand reef	22 2	168 40		
Norfolk Island, Mount Pitt, 1,050 feet	28 58	167 46	7 45	5-7
" Nepean island	29 2	167 48		
New Caledonia.				
Isle of Pines, Ngao peak, 880 feet	22 39	167 29		
" S Islet Ami	22 46	167 35	8 6	4
Umœo Bay, Port Victoria, Pine island	22 31	167 26		
Queen Charlotte cape, Goro	22 19	167 2		
Cape Ndua, extreme	22 24	166 57		
Woodin Passage, Ia peak	22 22	166 46		
Mount D'Or, 2,543 feet	22 16	166 37		
Noumea, Port de France, S.W. bastion	22 16	166 27	8 25	4
Bulari Pass, A madeo island	22 29	166 29		
Port St. Vincent, Marceau island	22 0	166 5	5 50	4½
Cape Goulvain	21 45	165 26		
Point Tonnerre	20 21	164 3		
D'Entrecasteaux reef, Huon island	17 59	162 55		
Balade	20 18	164 27	6 15	4
Cape Colnett	20 31	164 46		
Yengen, outer anchorage	20 37	164 53	6 15	4½
Port Kanala	21 29	165 59		
Cape Coronation	22 2	166 52		
Loyalty Islands.				
Mare, or Britannia island, S. point	21 42	168 0		
" Castle, or Desgraz Point	20 37	167 48		
Lifu, or Chabrol, Pine or W. cape	21 9	167 21		
" Sandal bay	20 50	167 2	6 30	5-6
Uea, or Halgan island, C. Gervaise	20 41	166 34		
Beaupré islands	20 26	165 11		
Astrolabe reef, north point	19 40	165 26		
Simpson reef	21 30	166 50		
Petrie reef	18 35	164 24		
Ross bank, 400 fathoms	33 32	167 40		
Low Archipelago, or Paumotu Group.				
Ducie island	20 40	124 48W		
Elizabeth, or Henderson island	24 21	128 19		
Piteairn island, Adamstown	25 4	130 8		
Oeno island, N. point	24 1	130 41		
Timoe, or Crescent island	23 20	134 35		
Manga Reva, or Gambier island, Mount Duff 1248ft	23 8	134 55	(?) 30	3
Marutea, or Lord Hood's island	21 31	135 33		
Maria, or Moerenhout	21 59	136 12		
Amphitrite, or Actæon islands	21 18	136 38		
Tureia, or Carysfort island	20 45	138 19		
Marurea, or Osnaburgh island	21 51	138 44		
Gloucester isles, Margaret island	20 23	143 37		
Anuanuraro, or San Miguel Arcangel	20 23	143 47		
Vana Vana, or Barrow island	20 45	139 3		
Whitsunday island	19 18	138 42		
Clermont Tonnerre island	18 34	136 20		
Pukaruha, or Serle island	18 23	136 55		
Pukarunga, or Egmont island	19 23	139 12		
Pinaki, or Byam Martin island	19 40	140 22		
Akiaki, Lanciers, or Thrum Cap island	18 30	139 8		
Queen Charlotte's island	19 48	138 42		
Nukutavake, or Lagoon island	18 42	138 43		
Tatakotoreu, or Narcissus island	17 20	138 23		
Amanu, or Moller island	17 43	140 37		
Hao, Harpe, or Bow island, N. end	18 6	140 59		
Nengonengo, or L'Ostange island	18 43	141 42		
Reitoru, or Bird island	17 48	143 7		
Hikuero, or Melville island	17 35	142 36		
Tauerec, or St. Simon island	17 22	141 24		
Fakaina, or Predpristie island	15 58	140 11		
Henuake, or Dog Island	14 56	138 48		
Disappointment Island, Napuke	14 9	141 18		
Angatau, or Arakechcoff island	15 51	140 51		
Takume, or Wolkhonsky island	15 44	142 9		
Barclay de Tolly, or Raroiai village	16 1	142 28		

Name of Place.	Lat.	Long.	Tides.	
			H. W. F. & C.	Rise.
	° /	° /	h. m.	feet.
Boscawen island - - - - -	15 52S	173 50W		
Keppel island - - - - -	15 53	173 52		
Curagoa reef - - - - -	15 32	173 29		
Ten-fathom bank - - - - -	15 40	173 40		
Niua-Fu, or Hope island - - -	15 34	175 41		
L'Enfant Perdu - - - - -	14 20	176 40		
Home or Lalla Rookh bank - - -	12 53	175 31		
Uea or Wallis island, Allier' bay	13 14	176 12		8
Futuna island - - - - -	14 14	178 7		
Alofi island - - - - -	14 19	178 0		
Fiji Islands.				
Vatua or Turtle island - - - - -	19 49	178 14	6 11	4
Ongea, centre - - - - -	19 4	178 23		
Fulanga - - - - -	19 3	178 47		
Kambara, South point - - - - -	18 57	179 1		
Tubanaileli, centre - - - - -	18 42	179 8		
Augasa or Table island - - - - -	18 55	178 35		
Namuku, centre - - - - -	18 50	178 38		
Motha - - - - -	18 35	178 37		
Oneata, Observatory island - - -	18 24	178 35		
Takemba, Kendi point - - - - -	18 14	178 52		
Argo or Bocatatanoa reef, South-east entrance	18 17	178 25		
Naiau or Oedida, summit - - - -	17 59	179 4		
Tabutha, North-west peak - - - -	17 37	178 42		
Chichia or Favourite island, South-east point	17 48	179 19		
Mango or Cox island, South-east point	17 29	179 10	6 10	3-5
Vanua Valavo or Sir C. Middleton island, North-west point	17 10	179 6		
Kanathia or Sim's island, South point	17 17	179 10		
Vaturera island - - - - -	17 19	179 34		
Naitamba or Direction island, centre - - -	17 3	179 17		
Yalangata island - - - - -	16 49	179 7		
Nukumbusanga - - - - -	16 18	179 18		
Thikombia or Farewell island, N. hummock	15 47	179 55		
Taviuna or Vuna island, North point	16 40	179 52		
Somusomu Town - - - - -	16 46	179 51		
Kamia, summit - - - - -	16 46	179 45		
Vanua Levu Island—				
Unda or North-east point (Edward island)	16 8	179 59		
Rambi or Gillett island, North-east point	16 24	179 57		
Savusavu bay, East point - - - - -	16 49	179 13E		
Kambelau island, extreme - - - - -	16 25	178 59		
Mbua or Sandalwood bay, Dimba-Dimba point	16 48	178 26	6 0	6 (?)
Yadua island, Porpoise harbour obs.	16 50	178 14		
Nalao bay, Tavea island - - - - -	16 38	178 40		
Muthuata town - - - - -	16 27	178 59		
Kia island - - - - -	16 14	179 1		
Mali island, West point - - - - -	16 21	179 14		
Goro island, North point - - - - -	17 13	179 23		
Horse Shoe reef (Thaku Momo) - - - - -	17 37	179 17		
Nairai, Needle peak - - - - -	17 48	179 24	5 53	5
Goa or Angau harbour - - - - -	17 59	179 14	6 7	5
Mumbolithe reef - - - - -	18 15	179 18		
Mbatiki island, summit - - - - -	17 47	179 7		
Moala or Mounala, North-east point	18 33	179 55	5 50	5
Tova reef, 2 feet, S. point - - - - -	18 39	179 26		
Totoya, or Totoua island, W. side - - -	18 59	180 7	6 37	4½
Matuku, Observatory bay - - - - -	19 10	179 44	6 18	5
Viti Levu island, Mbau island - - - - -	17 57	178 35	5 45	6
Rewa harbour, Nukulau island - - - -	18 11	178 28	6 45	4-6
Suva harbour, entrance - - - - -	18 7	178 20	6 0	6
Navula passage, Waldron island - - -	17 54	177 4		
Malolo island, N. point - - - - -	17 46	177 3		
Underwood group, Henry island - - -	17 41	177 13		
Ba (town of) - - - - -	17 27	177 34	5 45	6
Ovalau island, Levuka harbour, Obs. point	17 41	178 51	6 0	5 springs
Vatu Lele island, N. point - - - - -	18 31	177 33		2½ neaps
Kandavu peak - - - - -	19 1	178 15		
Tavuki bay - - - - -	19 3	178 6	6 38	5
Astrolabe reef, N. point - - - - -	18 42	178 25		
Yasawa group, Vomo island - - - - -	17 29	177 10		
Wai'alailaithaki, Obs. peak - - - - -	17 22	177 2		
Naviti island, N.E. point - - - - -	17 2	177 12		
Yasawa island, peak - - - - -	16 50	177 20		
Asaua island - - - - -	16 44	177 28		
Awakolo, or Round island - - - - -	16 40	177 40		
Viwa, or Biva island, W. point - - -	17 9	176 51		

Name of Place.	Lat.	Long.	Tides.	
			H. W. F.&C.	Rise.
New Hebrides.			h. m.	feet.
Aneiteum, point Inyang	20 15	170 21E	6 35	4
Erroman (Fotuna), N.W. point	19 31	170 11	7 24	4
Tanna island, point Resolution	19 31	169 19	5 35	3
Immer, or Aniwa island	19 21	169 31		
Erromanga island, Traitor's head	18 46	169 15	5 30	4
Vate, or Sandwich island, S.E. point	17 52	163 35		
Havannah harbour	17 32	168 26	(3) 8 15	3-4
Mai, or Three hills	17 4	168 20	6 30	5springs
Two hills, Monument rock	17 0	168 35		
Api, or Tasiko, Namuka islet	16 51	168 21		
Ambrym island, S. point	16 14	168 19		
Mallicollo island, port Sandwich	16 25	167 46	5 30	4
Maskelyne islands	16 32	168 19		
Pentecost, or Whitsuntide island, S. point	16 59	168 14		
Aurora, or Maewo island, Na-rovo-rovo	15 11	163 4	6 0	5springs
Lepers' island, centre	15 22	167 54		
Star island, or Pic de l'Etoile, summit	14 28	168 3		
Espiritu Santo, C. Cumberland	14 43	166 40		
C. Lisburn	15 40	166 44		
C. Quiros	14 55	167 5		
Banks' Islands.				
Vanua Lava, Great island, N point	13 41	167 25		
Port Patteson harbour	13 48	167 31	6 40	5
Bant or S point	13 57	167 22		
Mota, or Sugar Loaf island, S.E. point	13 50	167 39		
Valua, or Saddle island, E. point	13 36	167 38		
Reef islets, Itowo	13 35	167 28	6 30	5
Ureparapara, or Bligh island, W. point	13 38	167 14		
Santa Maria, E. point	14 15	167 34		
S.W. point	14 20	167 20		
Merigi, or Santa Claire	14 20	167 48		
Torres Islands.				
North island, North extreme	13 4	166 30		
Middle island, South-east extreme	13 15	166 37		
South island, South extreme	13 27	166 40		
Santa Cruz Group.				
Vanikoro, Mount Kapogo	11 36	166 53		
Ocili harbour	11 40	166 52		
Santa Cruz (Nitendi), cape Byron	10 40	166 0	4 50	4-5
cape Boscawen, South-west point	10 51	165 43		
Guerta, or Trevanion island	10 40	165 41		
Suckling reef	10 41	165 44		
Tinakula, Volcano island	10 23	165 47		
Duff's Group, Taumaco, or Disappointment island	9 57	167 0		
North island	9 45	167 4		
Bayonnaise bank	12 8	179 43W		
Rotumah, or Grenville island	12 32	177 13E		
Eagleston reef	12 30	178 0		
Isabella shoal	12 15	177 15W		
Hammond reef	15 32	175 20E		
Louisa bank	11 45	175 52		
Onaseuse, or Hunter island	15 31	176 11		
Carter's reef	15 42	176 28		
A reef	18 10	175 10		
Rockawash and shoal, p.d.	15 58	177 10		
Charlotte bank	11 15	173 12		
Pandora reef	12 11	172 7		
Fataka, or Mitre island	11 56	170 20		
Anouda, or Cherry island	11 37	169 40		
Tucopia, or Barwell island	12 11	168 43		
Marquesas Islands.				
Fatou Hiva, Venus point	10 31	138 43W		
Motanc, or San Pedro, South-South-east point	10 1	138 50		
Tubuata, Port Madre de Dios, watering place	9 56	139 9		
O-Hiva-Oa, cape Balgueric	9 43	138 50		
Feto Hougo, or Hood's island, centre	9 25	138 58		
Uapoa, or Roapoua island, North point	9 21	140 5		
Ua-huka, Danger point	8 54	139 33		
Nouka-Hiva, cape Martin	8 58	140 2	3 52	4
West point	8 54	140 19		
Motu-iti, or Hergest island	8 44	140 38		
Clark bank, South end	8 8	139 53		
Low island	7 53	140 25		
Hiaou or E-Iao island, 2,000 feet, South point	8 3	140 44		
Fetou Houhou or Chanal island, North-east point	7 55	140 34		

Name of Place.	Lat.	Long.	Tides,	
			H. W. F.&C.	Rise.
			h. m.	feet.
Detached Islands between Equator and 10° S.				
Caroline or Thornton island	9 54S	150 6W		
Malden island, anchorage West side	4 5	151 56		1½
Starbuck (Volunteer) island	5 36	155 51		
Tongarewa or Penrhyn island	8 55	158 7		
Jarvis island	0 23	159 54		
Tokolau or Union Group.				
Fakaafo or Bowditch island	9 20	171 4		
Nukunono or Duke of Clarence island	9 5	171 38		
Oatafu or Duke of York island	8 40	172 22		
Phoenix Group.				
Mary island	2 41	171 40		
Enderby island	3 8	171 8	5 0	4
Phoenix island	3 41	170 40		
Birney's island	3 34	171 33		
Gardner island, South-west point	4 38	174 40		4½
McKean island	3 35	174 17		
Hull island, W. point	4 30	172 21		
Sydney island	4 30	171 30		
	Lat. N.			
Baker island, centre	0 13N	176 29		
Howland island, centre	0 49	176 40	7 11	8
		Long. E		
Ellice Group.				
Independence or Sophia island	10 46S	179 31E		
Meek Shoal	10 40	179 8		
Nukulaeae or Mitchell group	9 27	179 54		
Funafuti or Ellice island, Eastern point	8 31	179 21		
Peyster group, Northern extremity Nukufetau	7 56	178 29		
Vaitupu or Tracy island, Southern point	7 30	178 46		
Niutao, Lynx or Speiden island	6 10	177 21		
Nui, Netherlands or Eeg island	7 13	177 14		
Gran Cocal Shoal	6 5	176 13		
Nanomago or Hudson island	6 19	176 23		
Nanomea, St. Augustine's island	5 39	176 6		
Paanopa or Ocean island	0 52	169 24 or (?)169 35		
Mattoetee or Kennedy's Point	8 36	167 50		
Pleasant or Shank's island	0 25	167 5		

North Pacific.

Islands between the Equator and 10 degs. N. Latitude.				
Walker islands	3 34N	149 15W	Var. 7' 5" E.	
Christmas island, S.E. point	1 41	157 14	4 23	2-3
Washington island	4 42	160 16		
Fanning island, English harbour, flashing light	3 53	158 23	6 0	3
Palmyra island	5 59	162 23	5 23	1-
Samarang isles, West islet	4 55	162 22		
Kingman reef	6 23	162 21		
Diana shoal	8 49	157 20		
Gilbert Archipelago.				
		Var. 9° 20' E.		
Arurai, Arore, or Hurd island	2 41 S	174 41 E		
Nukunau, or Byron island	1 25	176 40		
Onoatua, or Rotcher island	1 50	175 39		
Peru, or Maria island	1 20	176 11		
Tamana island	2 25	176 7		
Taputeoua, Bishop, or Drummond island	1 20	174 57		
Nanouti, or Sydenham island	0 36	174 21		
Aranuka, Nanouki, or Henderson island	0 11N	173 39		
Kuria, or Woodle island	0 15	173 27		
Apamama, Hopper, or Simpson's island	0 27	173 53	4 30	6
Majana, or Hall island	0 57	173 4		
Tarawa, or Knoy island	1 29	173 5	4 0	6
Maraki, or Matthew island	2 0	173 26		
Apian g, or Charlotte island	1 52	173 2		
Taritari, or Touching island, S. point	3 8	172 48		
Makin, or Pitt island, N. point	3 21	172 57		
Marshall Archipelago.				
		Var. 9° E.		
Mili, or Mulgrave islands, anchorage	6 15	171 56	5 0	6½
Majuro, or Arrowsmiths island	7 5	171 24		
Arhno, or Daniel island, E. point	7 27	172 7	4 45	

Name of Place.	Lat.	Long.	Tides.	
			H. W. F.&C.	Rise.
Pedder island, W. point	7 10N	171 46E	h. m.	feet.
Aur, or Ibbetson's islands, anchorage	8 19	171 10		
Maloelab, or Calvert islands, Kaven island	8 54	170 49	(β) 1 52	4
Erikub, or Bishop Junction island, S. point	9 6	170 4		
Wotje, or Romanzoff islands, Christmas harbour	9 28	170 16	(β) 2 30	(β) 7 ex.
Likieb, or Count Heiden islands, N.W. point	10 4	169 2		
Jemo, or Steep-to island	9 58	169 45		
Mejit, or New Year island	10 8	170 56		
Aijuk, or Tindall and Watts' island, Capenjuri island	10 17	169 59	(β) 4 53	(β) 8
Taka, or Souworoff island	11 11	169 51		
Bikar, or Dawson island	11 48	170 7		
Kongelab, Bigini, or Pescadore islands	11 19	167 25		
Rongerik, or Rimski-Korsakoff islands!	11 27	167 14		
Bikini, or Eschscholtz islands	11 40	166 24		
Wottho, or Schanz islands	10 5	166 4		
Kwajalein, or Catharine islands	9 14	167 2		
Ujæ, or Lydia islands	9 4	165 58		
Namo, or Margaretta islands	8 56	167 34		
Læ, or Brown islands	9 0	166 26		
Jabwat, or Princessa island	8 20	167 34		
Ailinglælab, or Musquillo group, Lib, North island	8 10	168 0		
Helut, or Elmore islands, South island	7 15	168 46		
Kili, or Hunter island	5 46	169 0		
Namarik, or Baring islands	5 35	168 13		
Ebon, Boston, or Covell islands	4 39	168 50	4 45	6
Eniwetok, or Brown Group, North island	11 40	162 15		
Ujilong, or Arricefos island, centre	9 39	161 9		
Caroline Archipelago.				
Kusaie, Ualan, or Strong island, Coquille harbour	5 21	163 1	Var.	7 50' E.
Pingelap, or MacAskill islands, North one	6 13	160 47		
Mokil, or Duperry islands, Aoura, N.E. point	6 42	159 50		
Ponapi, or Seniavine islands, Rono Kiti harbour	6 48	158 26	4 0	5½
Ant, or Andema group, S. extreme	6 43	158 6		
Pakin group, Kapenoar, or Pagenema island, W. point	7 5	157 57		
Ngatik, or Valentines islands, E. extreme	5 48	157 32		
Nukunor, or Monteverde islands, E. point	3 51	155 1		
Greenwich, or Constantin island	1 4	154 48		
Decapolis reef	0 32	152 51		
Oraluk, or Bordelaise island	7 39	155 5		
Dunkin island (β)	8 50	154 10		
Losap, or D'Urville island	7 4	152 42		
Mortlock isles, Lukunor, Port Chamisso	5 29	153 58		
Namoluk group, N.W. isle	5 55	153 14		
Truk, or Hogolen islands, Pise island	7 43	151 49		
" " Givry island	7 9	151 52		
" " Tsis island, N.W. point	7 18	151 48		
Hall islands, Mourileu island	8 48	152 20		
Lutke, or East Faui island	8 33	151 26		
Namonuito group, Piserarr island	8 34	152 33		
Tamatam, or Los Martires islands	7 34	149 29	Var.	5° E.
Poloat, or Enderby islands, Alet island	7 19	149 17		
Suk, or Ibargoitia island	6 35	148 22		
Pikelot, or Coquille islet	8 12	147 42		
West Faui islet	8 8	145 48		
Satawal, or Tucker island	7 22	147 6		
Lamotrek, or Swede islands	7 32	146 30		
" " Elato island	7 30	146 15		
Olimarao isles	7 44	145 57		
Ifalick, or Wilson islands	7 15	144 30		
Wolea group, North extremity	7 22	143 58		
" " Raour island, E. extreme	7 20	143 53		
Foraulep island	8 36	144 36		
Eauripik, or Kama islands	6 40	143 10		
Sorol, or Phillip islands	8 6	140 52	Var.	2½° E.
Fais, or Tromelin island	9 47	140 38		
Ulithe, or Mackenzie islands, Egoi, E extreme	10 8	139 55		
" " Mogmog island	10 6	139 46		
Yap, or Eap, or Unawb island, N. point	9 37	138 8		
Hunter reef	9 58	138 13		
Ngoli, or Matelotas islands, N. extreme	8 35	137 40		
Palau, or Pelew islands, Kyangle isles	8 8	134 17		
Babel-thuap, E. extreme	7 41	134 40		
Orolong island, Errakong harbour	7 11	134 21		
Pelelew island, S. point	7 2	133 18		
Angaur, or Niaur island, S.W. point	6 54	134 5		
St. David, or Freewill islands	0 57	134 21		

Name of Place.	Lat.	Long.	Tides.	
			H. W. F. & C.	Rise.
			H. m.	feet.
Helen reef, N.N.E. end	3 0N	131 52 E		
Mariere, or Warren Hastings island	4 20	132 29		
Anna, or Current island	4 39	132 4		
San Soral, or St. Andrew islands	5 20	132 20		
Tobi, or Lord North island	3 8	131 8		
Solomon Islands, New Guinea, etc.				
Santa Catalina island	10 53S	162 30		
Santa Anna island	10 49	162 31	1 tide	
San Christoval island, C. Phillip	10 31	161 27		
" Makira, or Leoné bay	10 25	161 36		S E. trade
" Cape Recherche	10 12	161 23		fft., with
" Cape Keibeck	10 28	161 59		W. wind
Contrarietiés island (Ulua)	9 51	162 0		7ft.
Malanta island, cape Zelee	9 45	161 39		
" Bauna	9 10	160 51		
" Bejean reef	8 56	160 38		
" Alite point, S.W. part	9 0	160 45		
" Cape Ritters	8 44	163 40		
" Cape Astrolabe	8 22	160 29		
Gudalcanar island, islet off E. cape	9 49	160 56		
" Cape Henslow	9 59	160 35		
" Cape Hunter	9 49	159 47		
" Wanderer bay, Boyd creek	9 42	159 40		
" Cape Esperance	9 16	159 46		
Florida Island, E. end	9 10	160 27	5 30	About 6
Buena Vista island				
Ysabel island, C. Prieto	8 34	159 54		
" Astrolabe harbour	8 31	159 41	abt 4	4-5
" Cape Comfort	7 24	158 11		
" Port Praslin	7 25	158 20		
Lass shoal	7 45	159 34		
Buraqoi, or Murray island	9 2	158 34		
New Georgia, cape Pitt	8 53	158 14		
" Cape Nepean	8 51	157 49		
" Cape Deception	8 42	157 30		
" Rendova bay	8 24	157 18		
Simbo, or Eddystone rock	8 18	156 31		
Keso, or Shark island, E. end	8 6	156 50	1 tide	
Choiseul island, cape Labé	7 29	157 55		
" Cape Alexander	6 42	156 33		
" Choiseul bay	7 0	156 31		
Treasury islands, N.W. islet	6 55	155 18		
Shortland island, cape Stephens	7 10	155 40		
Bougainville island, cape Friendship	6 44	155 40		
" Cape L'Averdi	5 30	155 7		
Bouka island, cape North	5 0	154 40		
Stewart's islands, Hogan's island	8 24	163 2		
Inattendue, or Gower's island	7 56	160 11		
Roncador reef (?)	6 17	159 14	3 30	About 6
Bradley reef	6 52	161 6		
Ontong Java, or Howe's group, W. end	5 24	159 10		
Mortlock, or Massacre isles	4 45	157 0		
Le Mair and Tasman's isles	4 29	159 28		
Findsbury reef	5 0	159 19		
Simpson's islands	4 52	160 12		
Marqueen and Cocos islands	4 36	156 30		
Nine islands	4 53	155 20		
Groene, or Hardy islands, S. island, S. part	4 38	154 10		
Rennel island, S.E. extreme	11 51	160 42		
Indispensable reef, N.W. end	11 44	159 58		
Schoefield, or Neptune reef	12 53	161 55		
Wells reef, East end	12 20	157 58		
Pocklington bank	10 36	155 47		
New Britain—				
Cape Stephens	4 4	151 32		
Cape Palliser	4 19	152 9		
Entrance point	4 52	152 15		
Cape Orford	5 24	152 4		
Quoy peak	5 37	151 47		
Port Montague	6 10	150 30		
Cape South	6 30	149 48		
Cape Anne	5 40	148 17		
Cape Gloucester	5 28	148 23		
Cape Lambert	4 12	151 41		
Mérite island	4 54	149 5		
Gipps reef	4 15	149 16		
Squally, or Kerué island	1 41	150 30		
St. Matthias island, centre	1 35	149 45		
Willamez island, S. point	5 15	149 58		

Name of Place.	Lat.	Long.	Tides.	
			H. W. F. & C.	Rise.
			h. m.	feet.
New Ireland—				
Cape St. George	4 51 S	152 48 E		
Cape Santa Maria	4 2	153 2		
Cape Byron	2 46	150 33		
Sandwich island, peak	2 55	150 44		
Duke of York island, point Hunter	4 7	152 22		5 or 6(?)
Carteret's harbour	4 22	152 50		
Gower's harbour, or port Praslin	4 50	152 54	1 tide	3 or 4
St. John's island, N.E. point	4 2	153 46		
Anthony Kaan island	3 30	153 30		
Faed, or Abgarris island, N. point	3 0	154 22		
Goodman island	3 33	154 37		
Gerrit Denny's island	3 4	152 34		
Lyra shoal	1 53	153 28		
Vischer's, or Fishers' island, centre	2 32	151 54		
New Hanover, Queen Charlotte's ford	2 32	149 50		
Portland islands, West point	2 38	149 29		
Admiralty islands, Sugar Loaf island, 800 feet	2 25	146 52		
" Western island	2 12	146 3		
" Nare's harbour, Observation island	1 55	146 41		
" Jesus Maria island, W. point	2 19	147 48	1 tide	
" La Vandola	2 14	148 10		
" Elizabeth island, N. end	2 55	146 49		
Purdy isles, Mole island	2 51	146 15		
Sherburne shoal, S.E. point	3 15	148 16		
Circular reef	8 18	147 40		
Sydney shoal	3 20	146 50		
Albert reef	3 58	147 58		
Victoria reef	4 13	148 10		
Anachoretas island	0 54	145 30		
Commerson island	0 45	145 17		
Los Monjos island	0 57	145 41		
Boudeuse island	1 26	144 34		
L'Echiquier island, S. point	1 40	144 3		
Hermit island, Alacrity harbour, Pémé island	1 29	145 8	1 tide	
Matty island	1 34	143 12		
Durour island	1 46	142 56		
Tiger island	1 45	142 20		
New Guinea and Louiside Archipelago.				
Fly river, Tree islet	8 41	143 37		
Aird hill	7 30	144 22		
Yule island, centre	8 50	146 32		
Redscar head	9 17	146 54		
Port Moresby, Basilisk pass	9 31	147 8	8 30	6
Mount Owen Stanley, 13,205 feet	8 53	147 32		
South Cape	10 44	150 14		
Hayter island, W. end	10 37	150 41		
Discovery bay	10 24	150 26		
East Cape village	10 12	150 53		
Basilisk island, Negro head	10 32	150 52		
Moresby island, S. point	10 40	151 2		
Cape Frere	10 5	150 12		
Cape Nelson	9 0	149 16		
Cretin isles	6 43	147 53		
D'Entrecasteaux Islands.				
Cape Ventenat	10 11	151 14		
Cape Mourilyan	9 38	150 30		
Goulvain island	9 45	150 56		
Laughlan islands, E. point	9 19	153 49		
Cannac island	9 19	153 30		
Woodlark island, E. end	9 9	153 5	7 15	4
Gassap, S. side	9 10	153 55		
Marshall Bennett islands, E. one	8 50	152 0		
Evans island	9 10	151 55		
China strait, Teste island	10 56	151 4	8 0(?)	5
Goshen strait, E. cape	10 12	150 53		
Coral Sea.				
Cato island and bank, centre	23 15	155 53	8 0	6
Capel bank, p.d.	25 18	159 20		
Wreck reef, Bird islet	22 10	155 29	8 3	6
Kenn reef, centre beacon	21 16	155 49	8 0	5½
Frederick reef, S. end	21 1	154 24		
Saumercz reef, N.E. cay	21 38	154 47	8 0	6
Bellona, etc., reefs, Herald cay	21 47	159 34		
Observatory cay	21 24	158 52	8 30	6
West point, S. Bellona reef	21 52	159 25		
Miller reef (?), Basque	21 51	158 2		1½
Chesterfield reefs, Loop island	19 58	158 30		

Name of Place.	Lat.	Long.	Tides.	
			H. W. F.&C.	Rise.
Bampton reefs	19 1 S	158 27 E	h. m.	feet.
Brown reef (?)	17 38	154 33	8 30	5-6
Marion reef	19 10	152 14		
Mellish reefs, Duroe reef beacon	17 25	155 53		
Lihou reefs, S.W. extreme	17 38	151 26	7 55	5-6
Observatory cay, N.E. end	17 7	152 6		
Herald cays, North cay	16 56	149 12		
Herald's surprise	17 21	148 29		
Flinder's reefs, S. end	17 53	148 28	9 15	8-12
Malay reef	17 58	149 20		
Holmes reef, W. extreme	16 30	147 48		
Coringa, or Willis islets, E. one	16 53	149 55		
Madelaine cays, S. one	16 36	150 20		
Willis's islets, S one	16 17	150 1	8 0	6
Osprey reef, N.E. extreme	13 51	146 36	8 36	6
Diana bank (?) p.d.	15 41	150 30		
Eastern fields, N.E. extreme	10 2	145 45		
Grimes shoal	23 53	161 10		
Hamond island (?)	22 30	162 51		
A rock (doubtful)	24 0	160 15		
Tamar reef	21 21	161 36		
Fairway reef	21 0	161 45		
Nereous shoal	20 5	160 30		
La Brillante shoal	23 14	169 55		
Middleton reef, W. end	29 29	159 4		
Elizabeth reef, centre	29 55	159 4	9 0	9springs
Lord Howe's island, mount Gower	31 36	159 5	8 30	6
N.E. bay	31 32	159 5		
Ball pyramid	31 45	159 15		
Coast of Queensland.				
Cape Melville, N.E. extreme	14 10	144 33		
Lizard island, summit	14 40	145 30	9 15	7-10
Cape Grafton, Northern summit	16 53	145 57		
FitzRoy isle, summit	16 56	146 1		
Rockingham bay, Gould isle peak	18 9	146 12		
Cape Cleveland, N.W. extreme	19 10	147 1	7 30	10-12
Cape Bowling Green, lighthouse	19 19	147 27		
Cape Upstart, Sandy bay	19 43	147 47		
Port Denison, Observatory point	20 1	148 18	9 30	6
Northumberland reefs, S.E. peak	21 57	150 44		
Mackay, or Pioneer rock, lighthouse	21 10	149 12	11 7	10-16sp.
Port Bowen, Round islet	22 31	150 50	10 25	11-15
FitzRoy river, light vessel	23 32	150 17		
Cape Capricorn, lighthouse	23 28	151 15		
Capricorn group, Masthead islet, W. point	23 33	151 44	9 0	10
Bunker group, No. 1 island	23 54	152 24		
Lady Elliott islet, lighthouse	24 7	152 45		
Port Curtis, Gatcombe lighthouse	23 53	151 24	9 30	10-12
Bustard head, lighthouse	24 0	151 43		
Burnett river, lighthouse	24 45	152 25	9 30	8-9
Sandy cape, lighthouse	24 43	153 14	8 50	6-8
Breaksea spit, N.E. extreme	24 24	153 13		
Wide bay, outer edge of bar	25 49	153 10	8 30	6
Cape Moreton, lighthouse	27 2	153 29	9 30	3-7
Coast of New South Wales.				
Shoal bay, entrance	29 25	153 22		
Port Macquarie, entrance	31 25	152 54	9 15	5-3
Port Stephens, Stephens point lighthouse	32 45	152 13	8 30	6-4
Newcastle harbour, Nobby head, lighthouse	32 55	151 49	9 0	3-5
Cape Three Points, second point	33 30	151 27		
Broken bay, Baranjo head	33 35	151 20	8 30	5-7
Port Jackson, outer S. head lighthouse	33 51	151 18	8 15	5 and 4
Fort Macquarie	33 52	151 14		
Cape Banks, extreme	34 0	151 16		
Bellambi bay, centre	34 22	150 57		
Wollongong head	34 25	150 56		
Jervis bay, Bowen island, N. point	35 7	150 47		
Jervis bay lighthouse	35 9	150 47	8 30	5
Ulladulla lighthouse	36 12	150 30	8 30	6
Bateman bay, S.W. Tollgate island	35 45	150 16	8 0	4-6
Cape Dromedary, extreme	36 18	150 9		
Twofold bay, Look-out point lighthouse	37 4	149 55	8 15	5 | 7
Cape Howe, Gabo island lighthouse	37 34	149 56	8 50	6
Bass Straits.				
King island, cape Wickham lighthouse	39 35	143 57	0 48	3
Kent group, Deal island lighthouse	39 30	147 21	11 10	8
Banks stream, Swan island lighthouse	40 43	148 8		

Name of Place.	Lat.	Long.	Tides.	
			H. W. F. & C.	Rise.
			h. m.	feet.
Tasmania.				
Eddystone point (B) lighthouse	40 59S	148 22 E	9 39	7
Port Dalrymple, Low head light	41 3	146 49	0 5	10-7
Hobartown, Fort Mulgrave	42 54	147 21	8 15	3½-4½
Coast of Victoria.				
Port Albert lighthouse	38 36	146 41		
Cape Schank lighthouse	38 29	144 53		
Port Phillip point, Lonsdale lighthouse	38 18	144 37	9 42	7-5
" Schnapper light	38 13	145 2	2 14	2½
" Geelong, customhouse	38 9	144 22	2 30	3½-2½
" Melbourne Observatory	37 50	144 59	2 48	
Cape Otway lighthouse	38 52	143 31		
Warrnambool, upper light	38 26	142 32	0 37	3
Port Fairy, lighthouse	38 43	142 19	0 31	3
Portland bay, Observatory hill	38 22	141 38		
Coast of South Australia.				
Cape Northumberland light	38 3	140 38		
Cape Jaffa light	36 55	139 36	0 6	5
Kangaroo island, cape Willoughby lighthouse	35 51	138 10		
St. Vincent gulf, cape Jervis lighthouse	35 38	138 9		
" Glenelg flagstaff	34 59	138 33		
" Port Adelaide lighthouse	34 48	138 30	5 25	5-8

Lights—Coasts of New Zealand, Australia, etc.

NEW ZEALAND—

Cape Maria Van Dieman, *white, revolving* every minute, visible 24½.

Red, fixed to shew over Colombia reef.

Tiritiri, *white, fixed*, visible 23½.

Ponui, Passagé (Sandspit), *white, fixed*, visible 12'.

Portland Island, *white, revolving* every 30 seconds, visible 24'.

Red, fixed, over Bull Rock.

Napier, *white, fixed*, visible 18'.

Pencarrow Head, *white, fixed*, visible 30'.

Manukau Head, *white, fixed*, visible 26'.

Brothers, Cook's Straits, *white, flashing* every 10 seconds, visible every 22'.

Fixed, red, over Cook Rock.

Cape Campbell, *white, revolving* every minute, visible 19'.

Godley Head, *white, fixed*, visible 27'.

Akaroa, *white, flashing* every 10 seconds, visible 22'.

Timaru, *white, fixed*, visible 11½.

Moeraki, *white, fixed*, visible 19'.

Taiaroa Head, *red, fixed*, visible 20'.

Cape Saunders, *white, revolving* every minute, visible 20'.

Nugget Point, *white, fixed*, visible 23'.

Dog Island, *white, revolving* every 30 seconds, visible 18'.

Centre Island, *white, fixed*, visible 22½, with *red arcs* over inshore dangers,

Puysegur Point, *white, flashing* every 10 seconds, visible 19'.

Hokitika, *white, fixed*, visible 16'.

Cape Foulwind, *white, revolving* every 30 seconds, visible 19½.

Farewell Spit, *white, revolving* every minute, visible 17', with *red arc* over Spit end.

Nelson, *white, fixed*, visible 12½ with *red arc* to mark limit of anchorage.

AUSTRALIA—

Cape Melville light vessel, off Channel Rock, in 14 fathoms, light visible 10'.

Lady Elliott Island, *white, flashing* every half minute, visible 10'.

Sandy Cape, *white, revolving* every 2 minutes, visible 22'.

Great Sandy Strait, North Bluff light, *white, fixed, red* between S.W. ¼ W. and W. ¼ S.

Great Sandy Strait, Middle Bluff light, *white, fixed, red* between S.S.W. ¼ W., and S. ¼ E., and obscured between N.N.W. ¼ W., and N. by W. ¼ W.

Cape Moreton light, *white, revolving* every minute, bright for 15 seconds and eclipsed 45 seconds, visible 26'.

Shoal Bay, a *red* light, visible 6', shewn from pilot station.

Sugar Loaf Point light, *white, revolving*, greatest brilliancy every half minute, visible 22', and *fixed green*, visible 3' from S. to S.E. by E. ¼ E.

Stephen's Point, *white* and *red* alternate, *flashing* every minute, visible 17'.

Newcastle, light, *white, fixed*, visible 18' from N. by E. ¼ E. to S.W. by W.

- Broken Bay, Barango Head, Two *bright, fixed* (temporary), visible 8'.
 Sydney, Outer South Head, *white, revolving* every $1\frac{1}{2}$ minutes, visible 25'.
 Inner South Head, *white, fixed*, visible 15', between N. W. by N. and S. W. $\frac{1}{2}$ W.
 Woollongong Harbour, *red, fixed*, from S.S.W to W. by N. $\frac{1}{2}$ N.
 Cape St. George, *white, red and green, alternate* every $\frac{1}{2}$ minute; white visible 18', red and green, 14'.
 Ulladulla Harbour, *green, fixed*, visible 7'.
 Twofold Bay, *red, fixed*, visible from N.W. by W. $\frac{1}{2}$ W. to S.W. $\frac{1}{2}$ S., 9'.
 Gabo Island, *white, fixed*, visible 20'.
 Bass Strait—
 Wilson's Promontory, *fixed*.
 Kent Group, *white, revolving* every minute, visible 35'.
 N. extreme King Island, *white, fixed*.
 Goose Island, *fixed*.
 Swan Island, *white, revolving* every minute, visible 14'.
 Port Albert, *red, flashing*, visible 9'; flashes every 3 minutes, but continuous within 3'.
 Cape Shanck, *white, fixed*, with a flash every 2 minutes, visible 25'.
 Port Phillip, Lonsdale Point, *fixed, green*, from N. by W. to N. W. $\frac{1}{2}$ W., *red*, N. W. $\frac{1}{2}$ W. to W. by S., visible 10'.
 Port Phillip, Shortland Bluff, High light, *white, fixed*, between E. and N., visible 17'.
 Port Phillip, Shortland Bluff, Low light, *red and white fixed, white* from N.E. by E. to N.E., *red* from N.E. to N.N.E., and *white* from N.N.E. to W. by N.; white light visible 14', red light 10'.
 Cape Otway, *white, revolving* with flash every minute, visible 24'.
 Warnambool Harbour, *white, fixed*, visible 14', and a lower fixed red.
 Port Fairy, *red, fixed* with flash every 3 minutes from N.E. $\frac{1}{2}$ E. to S. by E. $\frac{1}{2}$ E., visible 9'.
 Portland Bay, *fixed red* (seaward), between N. W. $\frac{3}{4}$ W. and S. by E., and (in shore) *white*, visible 13'.
 Cape Northumberland, *revolving, white, red and green*, alternately 1 minute; white light visible 18'.
 Cape Jaffa, *white, revolving* every half minute, visible 16'.
 Sturt Light, *white, revolving* every $1\frac{1}{2}$ minutes, visible 24'.
 Cape Jervis, *white, fixed*, from S.S.W. $\frac{1}{2}$ W. to N. $\frac{1}{2}$ W., visible 13'.
 Tasmania—
 Iron Pot, Derwent River, *fixed* light, visible 14'.
 Cape Bruny, *revolving* every $1\frac{1}{2}$ minutes, visible 22'.
 Port Dalrymple, *revolving* every $1\frac{1}{2}$ minutes, visible 15'.
 Currie Harbour, W. Coast, King Island, *flashes* every 12 seconds, visible 17'.

ISLANDS—

- New Caledonia, Bulari Passage, *white, fixed*, visible 20'.
 Suwaroff, an occasional light when traders are in the neighbourhood.
 Tahiti, Point Venus, *white, fixed*, visible 15'.
 Fiji, Levuka Harbour, two *fixed*; upper *white*, visible 10'; lower *red*, visible 5', in one E. $\frac{1}{2}$ N. and W. $\frac{1}{2}$ S.

BEARINGS AND DISTANCES.

Coast of New Zealand.

THE following Bearings are *magnetic*, and the Bearings and Distances given are (except where otherwise stated) the actual ones from place to place:—

North Island (East Coast).

- Three Kings, Western Island, to Cape Maria Van Dieman light—E. by S. $\frac{2}{3}$ S., 36'.
 " Cape Morton Jones, N.E. extreme, to North Cape—E. $\frac{2}{3}$ S., 47'.
 North Cape to Stephenson's Island—S.E. by E. $\frac{1}{2}$ E., 48'.
 North Cape to Cape Brett—E.S.E., 78'.
 Cape Brett to N. extreme Poor Knights—S.E. by E. $\frac{2}{3}$ E., 26'.
 " to Sugar Loaf Rock—S.E. $\frac{1}{2}$ E., 30'.
 N. extreme Poor Knights, to W. extreme Moko-Hinou Islets—S.E. $\frac{1}{2}$ E., 31'.
 " to E. extreme Chickens—S.S.E., 26'.
 Sugar Loaf Rock to W. " to Bream Head—S. $\frac{1}{2}$ W., 18'.
 " to Bream Tail—S. by E. $\frac{2}{3}$ E., 10 $\frac{1}{2}$ '.
 Bream Tail to McGregor Rock—N.E. $\frac{1}{2}$ E., 23 $\frac{1}{2}$ '.
 W. extreme Moko-Hinou to N.W. extreme Little Barrier—S. by E. $\frac{1}{2}$ E., 16 $\frac{1}{2}$ '.
 West extreme Little Barrier to Shearer Rock—South, 25'.
 E. extreme Chickens to E. extreme Kawau—S.S.E. $\frac{1}{2}$ E., 32 $\frac{1}{2}$ '.
 Bream Tail to Cape Rodney—S.E. $\frac{1}{2}$ E., 17 $\frac{1}{2}$ '.
 Cape Rodney to Takatau Point—S.E. $\frac{1}{2}$ S., 5 $\frac{1}{2}$ '.
 Takatau Point to E. extreme Kawau—S. E. by S. $\frac{2}{3}$ S., 4 $\frac{1}{2}$ '.
 E. extreme Kawau to Nelson Rock—E. by N. $\frac{1}{2}$ N., $\frac{1}{2}$ '.
 Nelson Rock to Flat Rock—E. $\frac{2}{3}$ S., 1 $\frac{1}{2}$ '.
 " to Rangitoto Reef—S. $\frac{1}{2}$ E., 21'.

- Flat Rock to Shearer Rock—S. by E. $\frac{1}{2}$ E., 9 $\frac{1}{2}$.
 Shearer Rock to Rangitoto Reef—S. $\frac{1}{2}$ W., 12'.
 Rangitoto Reef to N. Otanto Islet—N.E. $\frac{1}{2}$ N., 8 $\frac{1}{2}$.
 " to N. side Channel Island—N.E. by N., 32 $\frac{1}{2}$.
 N. side Channel Island to N. extreme Cuvier Island—E. by N. $\frac{1}{2}$ N., 21 $\frac{1}{2}$.
 " to N. side Richard's Rock—E. $\frac{1}{2}$ S., 31'.
 Richard's Rock to E. extreme Red Mercury—S.E. $\frac{1}{2}$ S., 21'.
 E. extreme Red Mercury to Tauranga—S.S.E., 60'.
 " to W. Alderman—S.E. by S. $\frac{1}{2}$ S., 20 $\frac{1}{2}$.
 W. Alderman to W. extreme Mayor Island—S.E. $\frac{1}{2}$ S., 21 $\frac{1}{2}$.
 W. extreme Mayor Island to Tauranga—S. $\frac{1}{2}$ E., 19 $\frac{1}{2}$.
 Tauranga to Astrolabe Reef, N.E. $\frac{1}{2}$ E., 13 $\frac{1}{2}$.
 Astrolabe Reef to N. extreme White Island—E. by N. $\frac{1}{2}$ N., 35'.
 N. extreme Mayor Island to N. extreme White Island—E. $\frac{1}{2}$ S., 47 $\frac{1}{2}$.
 N. extreme White Island to Cape Runaway—E. by N. $\frac{1}{2}$ N., 38'.
 Cape Runaway to Midway Point—E. by N. $\frac{1}{2}$ N., 10 $\frac{1}{2}$.
 Midway Point to Cape Matakawa (Hicks' Bay)—East, 6 $\frac{1}{2}$.
 Red Mercury to " —E. by S., 127'.
 Cape Matakawa to East Cape Islet—E. by S., $\frac{1}{2}$ S., 14'.
 East Cape Islet to Open Bay, S. Head—S. $\frac{1}{2}$ W., 25'.
 East Cape Islet to Tokamapuhia Reef—South, 39'.
 Tokamapuhia Reef to S. Head Tologa Bay—S. $\frac{1}{2}$ W., 5'.
 East Cape Islet to Ariel Rocks—S. $\frac{1}{2}$ E., 65 $\frac{1}{2}$.
 Ariel Rocks to Gable-end Foreland—N. by W. $\frac{1}{2}$ W., 12'.
 " to Young Nick's Head—W. by S. $\frac{1}{2}$ S., 15'.
 " to Table Cape—S. by W. $\frac{1}{2}$ W., 26'.
 " to Bull Rock—S. by W. 36'.
 Bull Rock to Portland Light—S.W., 41'.
 Portland Light to Ahuriri Bluff—S.W. by W. $\frac{1}{2}$ W., 44 $\frac{1}{2}$.
 " to Cape Turnagain—S.S.W. $\frac{1}{2}$ W., 91'.
 " to Cape Kidnappers—S.W. westerly, 40'.
 Ahuriri Bluff to Cape Kidnappers—S.E. $\frac{1}{2}$ E., 12 $\frac{1}{2}$.
 Cape Kidnappers to Motu Kura—S. $\frac{1}{2}$ W., 13 $\frac{1}{2}$.
 Motu Kura to Black Hand Reef—S. $\frac{1}{2}$ W., 24 $\frac{1}{2}$.
 Black Hand Reef to Cape Turnagain—S. $\frac{1}{2}$ W., 18'.
 Cape Turnagain to Castle Point—S. by W. $\frac{1}{2}$ W., 31 $\frac{1}{2}$.
 Castle Point to N.E. (Eclipse) Reef—S. by W. 22'.
 N.E. (Eclipse) Reef to Kahau—S.S.W. $\frac{1}{2}$ W., 11 $\frac{1}{2}$.
 Kahau to Ono Point—S.W. $\frac{1}{2}$ S., 21 $\frac{1}{2}$.
 Ono Point to Cape Palliser—S.W. $\frac{1}{2}$ W., 8'.
 Black Rocks (or from 1' S. of C. Palliser) to Taurakira Head Reef—W. by N. $\frac{1}{2}$ N., 18' or (19 $\frac{1}{2}$).
 Taurakira Head Reef to Baring Head Reef—W.N.W., 31'.
 Baring Head Reef to S. end Barrett's Reef—N.W. $\frac{1}{2}$ N., 4'.
 Cape Terawhiti to Cape Campbell (Middle Island)—S. by W. $\frac{1}{2}$ W., 30 $\frac{1}{2}$.
 Nancarrow Head to " " —S.W. by S., 33 $\frac{1}{2}$.
- North Island (West Coast).**
- Cape Maria Van Dieman to N.W. extreme Columbia Reef—North, 3'.
 " to Reef Point—S.E. $\frac{1}{2}$ S., 48'.
 Reef Point to Wangape—S.E. $\frac{1}{2}$ E., 13'.
 Wangape to North Head Hokianga—S.E. $\frac{1}{2}$ E., 11'.
 N. Head Hokianga to N. Head Kaipara—S.E. $\frac{1}{2}$ E., 64'.
 N. Head Kaipara to N. Head Manukau—S.E. $\frac{1}{2}$ S., 44'.
 S. Head Manukau (along land) to Waikato River—S.E. $\frac{1}{2}$ S., 23'.
 Waikato River to Whaingaroa Head—S.E. by S., 22'.
 Manukau to Kawhia N. Head, off entrance—S.S.E. $\frac{1}{2}$ E., 62'.
 " to Albatross Point—S. by E. $\frac{1}{2}$ E., 63'.
 " to Piritoki Reef—S. by E. $\frac{1}{2}$ E., 77'.
 " to Mokau River, off entrance—S. by E. $\frac{1}{2}$ E., 98'.
 " to Waitara River—S. $\frac{1}{2}$ E., 116'.
 " to Sugar Loaves, New Plymouth—S. $\frac{1}{2}$ E., 122'.
 Sugar Loaves to N.W. point land near C. Egmont—S.W. $\frac{1}{2}$ S., 15'.
 Cape Egmont to Stephen's Island (Middle Island)—S.S.E., easterly, 84'.
 " to Codar Rock—S.E. by S. $\frac{1}{2}$ S., 110'.
 Cape Egmont to Cape Terawhiti—S.E. by S. easterly, 126'.
 " to Opunake (along land)—S. Easterly, 11 $\frac{1}{2}$.
 Opunake to Otumutua—S.E. by E., 5'.
 Otumutua to Patea—E. by S. $\frac{1}{2}$ S., 31'.
 Patea to Wa totara Passage (along land)—12'.
 Waitotara Passage to Wanganui River—E. $\frac{1}{2}$ S., 13'.
 Wanganui River to Manawatu River—S.E. by S., 33'.
 Manawatu River to S.W. extreme Kapiti—S. by W. $\frac{1}{2}$ W., 29'.
 S.W. point Kapiti to Mana Island—S. $\frac{1}{2}$ W., 14'.
 " to Cape Terawhiti—S.S.W.
 From 1' W.S.W. of Cape Terawhiti to 1' S. of Toms Rock—S.E., 6'.
 From 1' S. of Toms Rock to Pencarrow Light—E.N.E., 8 $\frac{1}{2}$.
 Cape Egmont to Farewell Spit Light (Middle Island)—S. $\frac{1}{2}$ W., 83'.
 " to Nelson —S. $\frac{1}{2}$ E., 121'.
 " to Brothers Light—S.E. by S. $\frac{1}{2}$ S., 113'.
- Middle Island (East Coast and Cook's Straits).**
- Farewell Spit Light to extreme of Spit (along Spit)—S.E. by E. easterly, 4 $\frac{1}{2}$.
 Extreme of Spit to Nelson—S.E. by S. $\frac{1}{2}$ S., 40'.
 Nelson offing (along land) to Pepin Point—N.E. by N. $\frac{1}{2}$ N., 10'.
 Pepin Point to Cape Soucis N.E. $\frac{1}{2}$ N., 10'.
 Cape Soucis to Pige Rocks Current Basin—N.E. $\frac{1}{2}$ N., 9 $\frac{1}{2}$.

- N.E. point Stephen's Island to Cook's Rock—S.E. by E., 20 $\frac{1}{2}$.
 Cook's Rock to Brothers Light—S.S.E. $\frac{1}{2}$ E., 3 and 5-6th miles.
 " to Cape Terawhiti (North Island)—S.E. $\frac{1}{2}$ E., 17.
 Brothers Light to Rocks A wash—S. $\frac{1}{2}$ E., 3 $\frac{1}{2}$.
 " to Cape Campbell—S. $\frac{1}{2}$ E., 38.
 West Head Tory Channel to 1 S. of Toms Rock (North Island)—E. by S. $\frac{3}{4}$ S., 18 $\frac{1}{2}$.
 Wairau Light to Pencarrow Light (North Island)—N.E. by E. $\frac{1}{2}$ E., 35 $\frac{1}{2}$.
 Cape Campbell (outer edge reef) to Waipapa Point—S. by W. $\frac{1}{2}$ W., 30 $\frac{1}{2}$.
 Waipapa Point to Kaikoura Peninsula—S. by W. $\frac{1}{2}$ W., 19.
 Kaikoura to Four-fathom Shoal—S. by W., 21.
 Four-fathom Shoal to Sail Rock Point—S.S.W. $\frac{1}{2}$ W., 15 $\frac{1}{2}$.
 Sail Rock Point to E. extreme Motunau Bank—S. by S. $\frac{1}{2}$ S., 10.
 Kaikoura to Godley Light, Port Lyttelton—S. by W. $\frac{1}{2}$ W., 80.
 " to N.E. extreme Banks' Peninsula—S. $\frac{1}{2}$ W., 84.
 Cape Campbell to E. extreme " —S. $\frac{1}{2}$ W., 134.
 S.E. extreme Banks' Peninsula to Otago Heads—S.W. by S. $\frac{3}{4}$ S., 152.
 E. extreme Banks' Peninsula to Akaroa Light (along land)—10.
 Akaroa to Timaru—S.W. $\frac{3}{4}$ W., 77.
 " to Oamaru—S.W. by S., 111.
 C. Wanbrow to S.E. extreme Fish Reef—S. $\frac{1}{2}$ E., 18.

Middle Island (East Coast and Foveaux Straits).

- S.E. extreme Fish Reef to Tairoa Head, Otago Light—S. $\frac{1}{2}$ W., 23 $\frac{1}{2}$.
 Tairoa Head Light to Cape Saunders Light—7.
 Cape Saunders to Nugget Point Light—S.W. by S. $\frac{3}{4}$ S., 51.
 Nugget Point to White Head—S.W. by S. $\frac{1}{2}$ S., 7.
 White Head to Long Point—S.W. $\frac{1}{2}$ S., 6 $\frac{1}{2}$.
 Long Point to Chaslud's Mistake—S.W. $\frac{3}{4}$ W., 10 $\frac{1}{2}$.
 Chaslud's Mistake to Brothers Point—S.W. by W. $\frac{1}{2}$ W., 6.
 Brothers Point to Slope Point Reefs—W.S.W. southerly, 7.
 Slope Point Reefs to Waipapa Point Reefs—W. by S., 7.
 " to Dog Island Light—W. by S. $\frac{1}{2}$ S., 21 $\frac{1}{2}$.
 Waipapa Point Reefs to The Bluff—W. $\frac{1}{2}$ S., 22.
 The Bluff to Hapuka Reef—W. $\frac{3}{4}$ N., 42.
 Hapuka Reef to Windsor Point—West, 51.
 Windsor Point to Table Rock—N.W. by W., 8 $\frac{1}{2}$.
 Table Rock to reef off Cape Providence—N.W. $\frac{1}{2}$ W., 5 $\frac{1}{2}$.

Middle Island (West Coast).

- Farewell Spit Light, along Spit W. by N., 6 $\frac{1}{2}$, and W. by S. 9 $\frac{1}{2}$ to Cape Farewell.
 Cape Farewell to Hitch Point—S.W. by W. $\frac{1}{2}$ W., 14.
 N.W. extreme Middle Island (Hitch Point) to Wanganui Inlet—S.W. $\frac{3}{4}$ S., 63.
 " to Stewart's Reef—S.W. $\frac{1}{2}$ S. 25 $\frac{1}{2}$.
 Stewart's Reef to Rocks Point—S. $\frac{1}{2}$ W., 15.
 Rocks Point to Buller River—S. $\frac{3}{4}$ W., 65.
 Stewart's Reef to Cape Foulwind (Three Steeples N.W. extreme)—S. $\frac{3}{4}$ W., 66 $\frac{1}{2}$.
 Cape Foulwind (Three Steeples) to Perpendicular Point—S. by W., 26.
 Perpendicular Point to Elizabeth Point—S. $\frac{1}{2}$ W., 16.
 Elizabeth Point to Grey River—S.E. by S., 4 $\frac{1}{2}$.
 Grey River to Hokitika—S. by W. $\frac{1}{2}$ W., 20.
 Hokitika to Abut Head—S.W. $\frac{3}{4}$ S., 38.
 Abut Head (along land) to Okarita Light—8.
 " to Taumaki Island—S.W. $\frac{3}{4}$ S., 73.
 " to N.W. point Jackson's Bay—S.W. $\frac{1}{2}$ S., 88.
 N.W. point Jackson's Bay to Cascade Point—S.W. by W., $\frac{1}{2}$ W., 11 $\frac{1}{2}$.
 Cascade Point to Reef, Awarua Point—S.S.W. $\frac{1}{2}$ W., 22 $\frac{1}{2}$.
 Reef, Awarua Point, to Brig Rock, Milford Sound (along the land S. by westerly), 17 $\frac{1}{2}$.
 Brig Rock, Milford Sound, to entrance off Bligh Sound—S.W. by S. $\frac{1}{2}$ S., 18.
 Entrance off Bligh Sound to George's Sound—S.W. by S. $\frac{1}{2}$ S., 6.
 George's Sound (along shore) to entrance off Doubtful Sound—S.S.W., 17 $\frac{1}{2}$.
 Doubtful Sound to Dagg's Sound—S. by W., 8.
 Dagg's Sound to W. extreme Breaksea Island—S. $\frac{3}{4}$ W., 13.
 E. extreme Breaksea Island to Rocks off S.W. extreme Five Fingered Point—S.S.W.
 W., 11.
 Five Fingered Point to West Point—S. by E. $\frac{1}{2}$ E., 12.
 West Point to Cape Providence—S.S.E. $\frac{1}{2}$, and 2 $\frac{1}{2}$ to S. eastward.

South Island and Foveaux Straits.

- White Rocks, N. extreme, to The Bluff (Middle Island)—E.N.E., 21.
 Port William entrance to Dog Island Light—N.E. by N. $\frac{1}{2}$ N., 17.
 Rock Reef to " —N. $\frac{3}{4}$ W., 26.
 " to Bruce Reef—E.S.E., 3.
 " N.W. extreme North Trap—S.W. $\frac{3}{4}$ S., 22 $\frac{1}{2}$.
 S.W. Cape Reef to N.W. extreme North Trap—E. $\frac{1}{2}$ N., 16 $\frac{1}{2}$.
 " to N. extreme South Trap—S.E. by E. $\frac{3}{4}$ E., 21.
 N.E. extreme South Trap to N.W. extreme North Trap—N. by W., 10 $\frac{1}{2}$.
 N. extreme South Trap to Boomerang Breakers, p.d.—N.W. $\frac{1}{2}$ N., 34.
 S.W. Cape to Snare's Peak—S.S.W., 62.
 N.W. extreme Big Snare's to N.E. of S.W. Rocks—S.W. $\frac{1}{2}$ W., 24.
 N.W. extreme Snare's to S. extreme South Trap—N.E., 70.
 N. extreme Solander Island to Windsor Point—N.W. $\frac{1}{2}$ N., 25.
 S. extreme " to Centre Island Light—N.E. by E. $\frac{3}{4}$ E., 39 $\frac{1}{2}$.
 " " to Dog Island Light—E. by N. $\frac{1}{2}$ N., 61.

Bearings and Distances from New Zealand.

THE following table gives the *true* bearings and distances of some of the islands, reefs, &c., in the different Groups, from different points in New Zealand. It is more intended to give an idea of actual distance than as an aid to navigation, as a glance at the chart will shew; and is not, except in a primary way, intended to point out the course to be followed; for which see paragraph on Passages.

AUCKLAND TO CAPE COLVILLE—40'.

Cape Colville to Opara—N. 75° E., 2120'.
" to Rimitara—N. 63° E., 1850'.
" to Haymet Reef—N. 66° E., 1360'.
" to Rarotonga—N. 55° E., 1595'.
" to Tahiti—N. 59° E., 2195'.
" to Hiva Oa, Marquesas—N. 59° E., 3080'.
" to Suwaroff—N. 39° E., 1810'.
" to Manahika—N. 40° E., 2030'.
" to Penrhyn Island—N. 42° E., 2210'.
" to Starbuck Island—N. 43° E., 2530'.
" to Malden Island—N. 41° E., 2570'.
" to Fanning Island—N. 30° E., 2790'.
" to Danger Island—N. 34° E., 1845'.
" to Kermadec Group—
Esperance Rock—N. 43° E., 415'.
Raoul, or Sunday Island—N. 37° E., 542'.
" to Rance Bank—N. 31° E., 860'.
" to N. Minerva Reef—N. 21° E., 830'.
" to Acis Reef—N. 40° E., 1060'.
" to Eoa Island, Tonga—N. 30° E., 1045'.
" to Savage Island—N. 37° E., 1300'.
" to Samoan Group—
Tutuila, Pago-pago—N. 30° E., 1535'
Upolu, E. end—N. 28° E., 1530'.
Savaii, W. end—N. 26° E., 1510'.
" to Keppel Island—N. 25° E., 1365'.

AUCKLAND TO MOKO-HINOU ISLANDS—63'.

Moko-Hinou to Phoenix Island—N. 22° E., 2130'.
" to Pakaafo, Union Group—N. 25° E., 1775'.
" to Gente Hermosa—N. 26° E., 1695'.
" to Rotumah—N. 4° E., 1410'.
" to Netherland Island, near centre of Ellice Group—N. 4° E., 1740'.
" to Nanouki Island, near centre of Gilbert Group—N. 2° W., 2165'.
" to Bonham Islands, near centre of Marshall Group—N. 7° W., 2450'.
" to Pouynipité, eastern part of Caroline Islands—N. 21° W., 2740'.
" to Gouapp, at western part of Caroline Islands—N. 36° W., 3420'.
" to Fiji Group, Simonoff Island—N. 19° E., 1005'.
" " Kandavu, Ngaloa Bay—N. 8° E., 1085'.
" " Ovalau, Lifuka—N. 10° E., 1170'.
" to Conway Reef—N. 2° W., 850'.
" to Brillanté Reef—N. 36° W., 810'.
" to Norfolk Island—N. 42° W., 540'.
" to New Caledonia, S.E. extreme Reef—N. 27° W., 890'.
" " Noumea—N. 28° W., 950'.
" to Loyalty Islands, Maré E. extreme—N. 23° W., 950'.
" to New Hebrides, Anciteum, Port Inyang—N. 16° W., 990'.
" " Tanna, Port Resolution—N. 16° W., 1040'.
" " Vate, Havannah Harbour—N. 18° W., 1165'.
" " S.W. extreme Mallicollo—N. 19° W., 1230'.
" " Espiritu Santo, C. Cumberland—N. 19° W., 1370'.
" to Banks Islands, Mota—N. 16° W., 1390'.
" to Torres Islands, N. extreme—N. 18° W., 1460'.
" to Ticopia—N. 13° W., 1450'.
" to Santa Cruz Group—
Nitendi, N.E. extreme—N. 17° W., 1600'.
Vanikoro—N. 16° W., 1525'.
Duff Island, S.E. extreme—N. 15° W., 1610'.
" to Solomon Islands—
S.E. extreme Santa Cantalina—N. 24° W., 1660'.
S.E. extreme Eddystone, or Simba—N. 31° W., 1940'.

AUCKLAND TO NORTH CAPE—196'.

North Cape to Rossell Island, S.E. extreme New Guinea—N. 36° W., 1855'.
" to Duke of York Island, New Britain—N. 33° W., 2280'.
" to Capel Bank—N. 52° W., 940'.
" to S. Bellona Reef—N. 44° W., 1060'.
" to Fairway Reef—N. 36° W., 1035'.
" to Bampton, N.W. part—N. 40° W., 1235'.
" to Kenn's Reef—N. 49° W., 1230'.
" to Lord Howe's Island—N. 77° W., 725'.
" to Middleton Reef—N. 60° W., 760'.

North Cape to Coast of Australia—

Sandy Cape—N. 59° W., 1140'.
 (Sandy Cape to Port Curtis, 115).
 Cape Moreton Light—N. 66° W., 1092'.
 Shoal Bay—N. 74° W., 1020'.
 Port Macquarie—N. 80° W., 1015'.
 Port Hunter, Newcastle—N. 85° W., 1065'.
 Port Jackson, Sydney—N. 88° W., 1036'.

CAPE MARIA VAN DIEMEN FROM AUCKLAND—220'.

Cape Maria Van Diemen to Coast Australia, Jervis Bay—S. 88° W., 1076'.
 C. Howe, Gabo Light—S. 80 W., 1117'.
 Manukau Heads " " Sydney—N. 85° W., 1165'.
 " " Kent Group, Bass Strait—S. 83° W., 1310'.
 " to S.E. extreme Tasmania—S. 73° W., 1290'.
 Cape Farewell " " —S. 81° W., 1115'.
 " to Kent Group, Bass Straits—N. 87° W., 1167'.
 " to Sydney—N. 69° W., 1100'.
 The Bluff to S.E. extreme Tasmania—N. 77° W., 900'.
 Cape Palliser to Bounty Islands, p.d.—S. 20° E., 400'.
 to Chatham Islands, Petre Bay—S. 67° E., 360'.
 East Cape " " —S. 27° E., 420'.

The New Zealand Pilot.

INTRODUCTION.

THE Islands of New Zealand—viz., North, South (or, as it was formerly called, "Middle"), and Stewart's Island—form an extensive curve facing the W.N.W., and are together about 930 miles in length, extending over more than 13° of lat. from the parallel of 34½° to that of 47½° S., and between the meridians of 166½° and 178½° E. The extent of coast line amounts to nearly 3,000 miles, and the area of the country to about 102,000 square miles. The North and South Islands are divided by Cook's Straits, the South and Stewart's Islands by Foveaux Straits. To Stewart's Island, which is a comparatively small, rugged, barren, and almost uninhabited territory, it is not necessary to make further reference. The North Island is divided into four and the South Island into five Provincial Districts; and the object of this introductory chapter is to give a short sketch of the Colony and of each Provincial District, with the principal cities, harbours, and productions, so as to give in small compass the information necessary for anyone intending to call at any part of the Islands.

COLONIAL STATISTICS.

The last census of New Zealand, in March, 1878, gave a total European population of 414,216, of which 158,208 were resident in the North Island and 256,008 in the South or Middle Island. By the natural increase and immigration the population at the end of 1880 will probably be about 450,000. The public revenue for the year 1880-81 is estimated by the Colonial Treasurer at £3,240,000. Since 1870 the Government have introduced at the public cost \$4,499 immigrants, and have spent £9,407,080 on the construction of railways, £1,215,520 on roads, £857,141 on public buildings, £409,013 on telegraphs, besides other public works. The public debt at the end of 1880 was £27,409,113, subject to an annual charge of £1,535,000. On the 31st March, 1880, there were 1,172 miles of railway open for traffic—361 miles in the North Island and 811 miles in the South. The telegraphs, which, like the railways, are all Government property, represented 3,638 miles of circuit and 9,333 miles of wire, and 234 telegraph stations were open to the public. The post offices in 1879 received and posted 20,957,818 letters, 499,477 post cards, 1,395,616 book packets and 10,057,944 newspapers. The deposits in the Government savings banks at the end of 1879 amounted to £787,005, and money orders for £428,673 were issued. On the 1st of January, 1880, there were open in the colony 817 public schools, at which a purely secular education is given free to 58,738 children in average attendance. The total expenditure on education in 1879 (including £150,581 for new school buildings) was £467,198. The average

cost for maintenance (school buildings excluded) was £4 7s. 8d, per scholar in average daily attendance.

The total imports into New Zealand for the year ending 31st December, 1879, amounted to £8,373,233, and the exports to £5,742,916. During the same period 883 vessels of 469,862 tons entered inwards at the various ports with cargoes, and 11 vessels of 4,078 tons in ballast. Of the vessels with cargoes 161 were from the United Kingdom, 621 from British possessions, and 100 from foreign countries or whale fisheries. The total imports into the colony for the six months ending 30th June, 1880, amounted to £2,928,732, of which the imports of the United Kingdom represented £1,722,861; Victoria, £477,573; New South Wales, £369,673; United States, £103,907; Mauritius, £88,023; Pacific Islands, £32,324. The exports from the colony for the six months ending 31st June, 1880, amounted to £3,673,775. Of the total exports £2,841,157 went to the United Kingdom. The principal articles of exports were: Wool, £2,010,258; gold, £599,200; agricultural products—wheat, oats, &c., £639,113; kauri gum, £152,326. The gold yield of the colony in 1879 was valued at £1,148,108.

THE NORTH ISLAND

is divided into four PROVINCIAL DISTRICTS, viz., Auckland, Hawke's Bay, Wellington, and Taranaki.

AUCKLAND, the most northern and extensive Province in the North Island, extends from the North Cape to the parallel of 39° S. on the East Coast, and the Mokau River on the West Coast. It is bounded on three sides by the sea, and on its South side by the other three Districts. It has a greater number of harbours than any other part of New Zealand. It contains 17,000,000 acres, and, stretching as it does through three degrees of latitude, has a climate varying from almost intertropical at the North to the sharp frosts of the Southern part. It produces maize, wheat, potatoes, &c., of excellent quality, and with a high per centage to the acre. Fruit-trees thrive and bear exceedingly well. The orange grows well out of doors, as does the grape. The propriety of introducing a class of men used to their culture and to wine making has been frequently discussed. In fact this Province contains within itself all those natural productions which determine the particular industries of nations, and which are usually only found in widely distant countries, as timber, kauri gum, coal, limestone, marble, gold, copper, iron, silver, chrome, lead, antimony, zinc, cadmium, plumbago, soapstone, mica, asbestos, sulphur, alum, manganese, and other minerals. Its medicinal hot springs are most valuable for many diseases, such as rheumatism, &c. Those at Rotomahana are very wonderful and beautiful, Its shores abound with fish. The timber of its forests is exceedingly valuable, and the numerous sawmills round its coasts are almost constantly in full work, employing a number of people and a fleet of coasters. In the first six months of 1880 timber to the value of £22,055 was exported. The coal mines are rapidly developing, the coal improving as the mines extend, and taking the place of imported coal. Its gold mines have in some instances proved wonderfully rich. Export for the six months ending 30th June, 1880, 26,447ozs., value £106,997. Stock breeding is receiving considerable attention. There are sheep-runs from its extreme North part, at the North Cape, to Poverty Bay, at its South extremity. There are numerous manufacturing industries, such as ship and boat building, engineering, iron foundries, potteries, tanneries, door and sash works, biscuits, bricks, soap, sauces, &c. The total imports for the district for 1879 are given at £1,526,425; exports, £622,597. Population in 1878 estimated at 84,200. A railway runs Southward 98 miles, opening a fine country, and Northwards sections of 16 and seven miles are open and a connecting section is under construction. There are also coal railways at Bay of Islands and Whangarei.

HAWKE'S BAY is situated on the East Coast, between Wellington and Auckland, and has an area of about 2,500,000 acres. A large proportion of the district is composed of land of great natural fertility, well suited for agricultural and pastoral purposes, but at present by far the most important industry is that of sheep-farming; and although such agriculture as is pursued gives a very high percentage to the acre, yet the returns from grazing are so profitable, and the climate seems so adapted to the rearing of pure-bred flocks, that as yet, while the country is thinly populated, it forms

the staple of the district. The value of wool exported for the first six months of 1880 was £204,176. The Ahuriri Plains of some 80,000 acres in extent is an exceedingly productive district; as many as five sheep to the acre can be carried all the year round, and abundant crops of all descriptions can be produced on them. It is well watered. This district has also an enormous extent of bush, containing an unlimited supply of some of the most valuable timber in New Zealand. Napier (its chief town) is the only harbour, and is not fit for large vessels. Tourists to the Lake District often visit Napier either to or from. The imports for 1879 were £168,561; exports, £370,362. The population of the district in 1878 was estimated at 15,300. A railway runs 65 miles South, forming part of main trunk to Wellington.

WELLINGTON occupies a central position, contains about 8½ million acres of land, and is bounded on the north by Auckland, on the east by Hawke's Bay and the sea, on the south and south-west by Cook's Straits, and on the north-west by Taranaki. It possesses many advantages incident to its position, and the possession of the excellent and spacious harbour of Port Nicholson, making it the commercial depot of a wide extent of country. It has however the disadvantage of being subject to shocks of earthquakes, but of late years these do not seem to have been violent in character or to have done any damage. There is a considerable extent of fertile plains and valleys, but much intersected by ranges of hills. Sheep-farming is carried on to a considerable extent—the export of wool for the first six months of 1880 amounted to £403,434. The imports for the district in 1879 were £1,593,026, and the exports £838,901. The chief articles of export are given in the notice of the city of Wellington. There are immense forests in the district of valuable timber. Port Nicholson and Wanganui River are the only noteworthy harbours in this district, and Patea River, which forms a portion of the boundary line between the Provincial Districts of Wellington and Taranaki. The population of Wellington in 1878 was estimated at 52,600.

TARANAKI, situated at the S.W. part of North Island, is the smallest, but one of the most fertile districts in New Zealand; it contains nearly three million acres of land, most of which is still in possession of the natives. The climate is exceedingly healthy. It is essentially an agricultural district, and all kinds of produce flourish in the greatest luxuriance. The magnificent mountain of Mount Egmont is its great topographical feature, and round its base lie some splendid plains, but the great drawback to this district is the want of a harbour. An artificial harbour upon plans approved by Sir John Coode is however in process of construction at a cost of probably £250,000. On its beaches there is practically an unlimited supply of iron sand from which the finest steel can be made; as yet, however, it has not been found profitable to work. The only other anchorage in the district is at Opunake Bay, and for small craft at Waitara and Patea and Mokau rivers—the two latter being part of the Provincial boundary line. Population of district in 1878 was estimated at 9,640. Imports in 1879, £32,230.

A short account of the chief ports and towns in the North Island now follows, beginning at the North:—

MONGONUI, once the resort of whalers, but the harbour is now more used by small than large vessels. There is steam communication weekly with Auckland, with which it is connected by telegraph. Its chief export is timber. In 1878 75 vessels entered inwards, of which only 2 were foreign. The population of the town was 123 in 1878.

WANGAROA, an excellent harbour when inside, but the entrance is narrow. There is a very large export of timber, as much as 100,000 feet per week being cut by the Auckland Timber Company. Coal has also been found in the district. The shipping returns for 1878 give 201 vessels coastwise and one foreign. Population, 201. Weekly steam communication with Auckland.

RUSSELE (BAY OF ISLANDS) is the port of entry of the magnificent harbour of Bay of Islands. It stands on the site of Kororareka, the original capital of New Zealand. There are manganese mines here which produce about 1500 tons annually. But coal is its chief export. The returns for 1878 give 1840 tons coal, 1000 gallons of sperm oil, and 8000 lbs. wool, 495 vessels coastwise and 8 foreign. It is still the resort of whalers to refit, etc., and besides the numerous steamers which call here a number of small vessels are

regularly in the coal trade. The quality of coal is now very superior both for steaming and household purposes. When the railroad which is now being constructed is completed to deep water a great impetus will be given to this trade. The latest returns give the quantity of coal exported at about 5000 tons per month.

WANGAREI HARBOUR has two anchorages suitable for shelter (see Sailing Directions) near the Heads. The township at the head of navigable part of the river is 15 miles from the Heads. Lime and coal abound in the district. There are also mineral springs in the neighbourhood. The Kamo coal mines are now being connected with the loading ground by railroad, when the export is expected to be very large, as the coal is of a superior description; at present it is made as far as the wharf at the township. Good marble has lately been found near the mines, and the hydraulic lime is noted in the Colony for its excellent quality. Frequent steam communication with Auckland.

KAWAU.—There is excellent shelter and anchorage here in Bon Accord Harbour, etc. The island of Kawau is now owned by Sir George Grey, who resides here, and has stocked it with rare plants, shrubs, and a variety of animals, such as elk, deer, etc. Formerly a copper mine was worked here.

MAHURANGI—to the south of Kawan Bay—has anchorage suitable for large vessels, and has regular steam communication with Auckland. Its shipbuilding and hydraulic lime are important industries.

AUCKLAND CITY—formerly the capital and seat of Government—is situated on the South shore of the Waitemata waters. With its suburbs—which are rapidly increasing—it covers a large area, and presents an imposing spectacle, for so young a Colony, to a stranger on rounding the North Head. The harbour may be said to be unrivalled in these seas as regards its capacity, the shelter and safety which it affords, combined with moderate depth and good holding ground. There are two principal wharves—viz., Queen-street Wharf, which projects 1680 feet from Custom-house-street into the harbour, with a depth at its end of 20 to 18 feet water at lowest springs. It can berth alongside probably some 30 vessels of from 100 to 2,000 tons burthen. The reclamations, which are being extensively carried out, extend nearly a third of the way down. The Railway wharf—so called from its being close to and connected with the terminus—is an extension of the solid breakwater, which was run out from what was formerly Britomart Point. It is 1,050 feet long, with from 12 to 10 feet water at its end at lowest springs, and can berth probably some 12 to 15 vessels of suitable draught. The deposit of silt lately, owing in part to the reclamation works, has much lessened the depth at these wharves. Dredging will no doubt be applied. The railway trucks go right alongside the vessels at the latter wharf. Between the two wharves is good shelter for small vessels and others lying at the different T's. On the east side of the Breakwater there are swimming baths. Eastward across Mechanics' Bay, from the inner part of the Railway Pier, the Breakwater is continued to the opposite cliff, with an entrance near the east end, forming a sort of wet dock for small vessels. Dries at low water. The land on the eastern side is occupied by Messrs. Fraser and Timne's boiler-making establishment, by shipbuilding yards, and by the Union Sash and Door Company; and westward to the Railway Pier is occupied by the railway workshops, terminus, etc. A short distance westward of Queen-street Wharf is the Graving Dock, a substantial stone structure, forming part of the reclamations. It is 300 feet long on the floor, 65 feet wide above, and 42 feet wide below; the width at caisson, 44 feet. It has 15 feet water on the sill at high springs, 13 feet at average springs, and 11 feet at neap tides. Vessels are docked under the personal superintendence of the Chief Harbourmaster. Westward of the Dock, towards Freeman's Bay, on the reclaimed land—which is in fact one long wharf—are the large mills of the Auckland Timber Company, shipbuilding yards, Gas Company's works, Coconut Oil Company, etc. Opposite the entrance to the harbour is the Naval Training School, occupying the old Mission buildings. The small vessel for teaching the boys practical seamanship is anchored off the beach. The Hospital is a magnificent building, on a commanding site. The Lunatic Asylum, more inland, is also a very extensive building, and generally speaking the banks and warehouses are handsome buildings, and the principal thoroughfare—Queen-street—presents an

animated scene in business hours. The railroad now extends 98 miles into the interior southward, and also connects the Kaipara waters with the Waitemata. Telegraphic communication is established from North to South of the Islands, and through Australia with the rest of the world. Auckland is the port of call for the San Francisco mail steamers, which come and go with remarkable punctuality every four weeks. The fine fleet of steamers of the Union Company are continually running, connecting Auckland with the rest of New Zealand and the Australian Colonies. A steam mail service to Fiji is now established, and numerous small steamers are continually running to the different ports of the district. Its fleet of trading vessels is too well known to call for further mention. Auckland-built schooners are to be found trading in every part of the Pacific, and the Island trade forms no inconsiderable item in the industries of the Colony. On the north side of Auckland harbour are the suburbs of Devonport and Woodside, to which ferry steamers run every half-hour. There are several ship and yacht building yards here, among them the well-known one of Mr. Niccol, who formerly had a patent slip. The Pilot Station is here. The schooner cruises in the offing to put pilots on board inward-bound vessels, when the wind is from West, round by North to East by North; with wind from other quarters, a boat goes out on signal being given. The Signal-station is on Mount Victoria, from whence vessels can be seen far out to seaward. Devonport may be called the Auckland Brighton, and is much resorted to in summer time. The returns for 1878 give 3944 vessels entered coastwise and 192 foreign. Its imports amounted to £1,409,000, and the exports to £544,000, among which were biscuits, £5,000; kauri gum, £133,000; leather, £16,300; flax, £6,400; potatoes, £5,500; soap, £2,500; tallow, £8,800; timber, £6,500; wool, £84,100. The above also includes—gold, £150,000, and silver, £5,800, from the Thames mines. The exports for the six months ending 30th June, 1880, amounted to £375,963, of which gold represented £106,997; kauri gum, £152,326; and wool, £43,591. The population in 1878, including suburbs, was 29,360. The Auckland district is well known for its valuable timber forests, suitable for ship or housebuilding, such as kauri, red and white pine, pohutakawa, etc.

BOROUGH OF THE THAMES, which includes the townships of Grahamstown and Shortland, is the principal centre of the goldfields district, and is built on the shore fronting the eastern head of the Frith. It is a port of entry. The shallowness of the water and exposed nature of anchorage to the north-west winds have together probably prevented its being used by large vessels, and it derives its supplies from Auckland, to whose Banks the gold is sent for export. The wonderfully rich yields of gold in the ranges close at hand have caused an equally wonderful development in the place. Probably few goldfields are so favourably situated, so close to the sea; and the miners can leave their houses to go to their work like ordinary tradesfolks in ordinary towns. By this it is meant that the goldfields town is, at the same time, an ordinary seaport, and no difficulty is experienced in getting to or from it, and all the expense and delays incident to most new "rushes" avoided. The following is taken from "Brett's Provincial Handbook" for 1880:—"The goldfields of the Thames and Coromandel districts are in the ranges which extend for 130 miles on the peninsula forming the eastern shore of the Hauraki Gulf, the Thames being the centre one at the head of the Gulf, Coromandel being about 25 miles further north along the peninsula, and Ohinemuri about 30 miles inland up the Thames river. All the points are easily accessible from Auckland, and connected with it by regular steam communication. The greatest impetus was given to gold mining in 1867, since when the yield has amounted to four and a-half millions sterling—the most productive year being in 1871, viz., £1,188,700. This return has never been approached since, though there is still a steady and profitable yield from many mines. The yield for 1878 was 55,982 ounces; value, £220,500. The yield per ton of quartz is higher on the Thames than on any other goldfield in New Zealand, and much larger than the average rates in the Australian Colonies." As might be expected from the vicinity of the forests there are several Sawmill Companies here, from which the output has been given at about 150,000 feet weekly. Southward in the fertile Thames valley there is a fine field for settlement. Harbour works to make the port more

accessible were spoken of. The shipping returns for 1878 give 1319 vessels coastwise and 2 foreign. The River Thames is navigable for light draught steamers for 70 or 80 miles. There are saw mills some eight miles up the river at Orere. Vessels drawing up to 14 feet can cross the bar at high water. (See remarks on Provincial Districts.)

COROMANDEL has already been incidentally mentioned in connection with the Thames Goldfields. It has the advantage of being a secure and easily accessible harbour, but there is only shelter for a limited number of vessels in from about 5 to 3½ fathoms of water. The entrance is wide, and a heavy sea comes in with westerly gales. Kapanga is the principal town of the county, which by the last census had a population of 2,056. There are saw mills at Cabbage Bay on west side of the Peninsula, and at Port Charles, Waikawa, and Kennedy's Bay on eastern side.

MERCURY BAY, a large inlet 30 miles from Cape Colville, affording anchorage for vessels of all sizes during westerly winds, and a snug anchorage secure from all winds in Mangrove River at its south-west end, where the lower saw mills are situated on reclaimed ground, and the coasters load timber, with which an extensive trade is done. Some eight miles up the river are the upper saw mills, also on reclaimed land. Vessels drawing six to eight feet can load here.

TAURANGA, in the Bay of Plenty, is the only harbour that affords shelter for vessels of burthen between Mercury Bay and Wellington. When once inside there is room for a fleet, but the entrance being somewhat difficult it is best adapted for steamers. (See Sailing Directions.) The town is built on a peninsula at the south-east end of the harbour, and is prettily situated. There are two wharves with berthage for vessels drawing up to 16 and 12 feet respectively. The land in the district is good, and the port has become the entrepôt for the whole of the Bay of Plenty. The harbour extends northward to Katikati, which settlement contributes materially to the trade of Tauranga. Coaches run regularly to the Lake District, this being the favourite and most accessible route to that wonderful region. The returns for 1878 give population of Town, 793; of County, 1,550. Vessels entered inwards, 457.

GISBORNE, the port of entry for Poverty Bay, a thriving town situated on the right bank of the Turanganui River, near the entrance. The land in the district is of a superior description. The stock of sheep and cattle is large and increasing. Coasting vessels and small steamers go into the river to the town, but vessels of any size, such as the Union Company's steamers, which call once a week, lay at anchor outside, and are tendered by a steam launch. The wool ships lie at anchor a little further out. The holding ground is good. Vessels have ridden out in bad weather, and no accidents have occurred. The population in 1878 is given at 1,204. Vessels entered inwards coastwise, 321. The exports in 1879 amounted to £37,507; in 1878 they were higher, viz.: Wool, £51,100; tallow, £700. Large quantities of grass seed of a very pure description are exported annually from here.

NAPIER (PORT AHURIRI), the capital and principal shipping port of the Provincial District of Hawke's Bay. Like most other New Zealand port towns, it is rapidly increasing in size and importance. The harbour is very confined, and only adapted to vessels drawing 10 or 11 feet of water. The entrance is uncertain, owing to what is known as the travelling shingle, to attempt to remedy which an outer breakwater is proposed. The Union Company's steamers call weekly, and are tendered as at Gisborne. The wool and other large vessels lie in the roadstead, which is variously stated as being "safe" and "anything but safe" in South and South-west winds, which "send a heavy swell into the bay." It is of course sheltered during West and Northwest winds, and is open to seaward from the North by East round to the South, but with ordinary summer sea-breezes is safe. (See Sailing Directions.) The returns for 1878 give a population of 8,376 for Napier city; 429 vessels coastwise and 21 foreign. The imports in 1879 were £168,561; exports, £385,004.

WELLINGTON (PORT NICHOLSON), the capital and seat of Government of New Zealand. Its harbour is the most central and one of the most commodious in New Zealand. Port Nicholson is a very extensive sheet of water, free from dangers, with an average depth of 10 to 15 fathoms. There is a patent slip, and buoys for swinging ships in Evans' Bay. The Queen's

Wharf, in Lambton Harbour, has from 23 to 27 feet at low water at its outer T, and on it are warehouses for wool, etc. A time-ball is dropped at noon. Since the removal of the seat of Government to Wellington its population and importance have greatly increased, and extensive reclamations from the edge of the harbour have been found necessary. It has many fine buildings—viz., Government House, the Houses of Assembly, the General Government Offices, etc., and Museum. It has two Cathedral Churches, one of which—the Roman Catholic—is a handsome and imposing edifice. Being the port for an extensive district, it naturally follows that railroads should radiate to the interior, and accordingly we find 45 miles completed on the main trunk Northwards towards Napier on the East Coast and 92 miles open for traffic centring at present at Wanganui in the Provincial District, but which will ultimately be joined to the Wellington line. Sections to effect this are now under construction. The industries for the whole of the Provincial District will be found in the district summary already given. The following are the returns for Wellington for 1878:—Population: City, 18,953. Vessels: Inwards coastwise, 1,487; foreign, 132. Imports, £1,440,382. Exports, £783,047, of which the following are some of the chief, viz.:—Grain, £811; gold, £35,310; hides, £1,976; hides and leather, £3,474; preserved meats, £6,469; flax, £3,311; rabbitskins, £1,194; sheepskins, £9,174; tallow, £61,014; wool, £648,190. Imports 1879, £1,517,713; exports, £838,901.

HOKIANGA—the northernmost port on the West Coast accessible to ships of large tonnage—is a bar harbour. The river is navigable for 15 miles from the heads, and has but few obstructions. There are several tributary streams falling into it, but not navigable for vessels drawing over 6 feet. It was one of the earliest settled districts in the Province, and was frequented by vessels for spars. The greatest number of shipping at one time was seven, each averaging 500 tons. There is a large area of rich land along the banks of the river, chiefly in the hands of the natives, and magnificent kauri forests among the ranges. The returns for 1878 give the European population of the country at 419. There were 37 vessels inwards coastwise and 2 foreign. It exported logs and spars to the value of £3,082. It is a port of entry, and has a Resident Magistrate. At present there is steam communication with Onehunga.

KAIPARA, a bar harbour, one of the most extensive inlets in New Zealand, and will probably become hereafter one of the most important. There is perfect security in it for any number of vessels of the largest size. There is 700 miles of water frontage. The principal river, the Wairoa, takes a direction parallel to the coast for 30 miles; navigable for vessels of large burthen. On its banks are several important sawmill establishments, which are rapidly becoming so many townships, from which it will be seen that timber is at present the principal industry. Nearly half a million feet has been cut weekly. There is a large extent of country of varied character—heavy bush land, rich flats, poor gum belts, etc. Like most of the northern parts of the district, it is an excellent fruit-growing country; produces splendid grapes, from which an excellent rough wine has been made. It is in regular communication with Auckland by steamer to Helensville (the head of the Kaipara, or Southern branch), and thence by train to Auckland. The returns for 1878 give—Population, 1,437. Vessels: Inwards coastwise, 185; foreign, 8. Exports: Timber, £28,090.

MANUKAU, also a bar harbour, is an extensive inlet opposite Auckland harbour, from which its town, Onehunga, is only distant six miles. Trains run to and fro frequently during the day. It is a place of considerable importance, as by its means Auckland enjoys rapid communication with Taranaki, Wellington, Nelson, and all the ports on the western seaboard. Sydney can be reached in less time from the Manukau than from any other port in New Zealand. The railroad runs to the wharf, and thus the coal from the Waikato mines can be delivered in any quantity. The Union steamers trade regularly from Onehunga.

NEW PLYMOUTH (OR TARANAKI), at the base of the slopes of Mount Egmont, and on the shores of the bight east of the Sugar Loaves, has a very inviting appearance, and is situated on some of the best land for agricultural purposes. The appearance to a stranger on nearing the coast is most decidedly English. Its great disadvantage is the want of a harbour or

shelter for shipping during westerly or on-shore winds. There are moorings laid down, and a regular system of surf-boats for landing passengers and cargo. Steps are now being taken to construct an artificial harbour at the Sugar Loaves of concrete, at an estimated cost approaching to £250,000. Ironsand, from which the best steel is produced, lies in inexhaustible quantities on the beach. Smelting-works are erected, but from the latest reports it has been found to be too difficult and expensive to work. Taranaki is in constant communication by sea with the rest of New Zealand. A railway runs to Waitara, and southward 22 miles, being one section of the main trunk through Wanganui to Wellington. The returns for 1878 give a population of 2,680. Ships entered inward coastwise, 191; foreign, 1.

SOUTH OR MIDDLE ISLAND

PROVINCIAL DISTRICTS.

NELSON, at the north-western part of South Island, is bounded by the sea to the north and west, by the districts of Westland and Canterbury to the south, and Marlborough to the east. A large proportion of the Provincial District is mountainous, rugged, and unfit for agriculture. The portion at present devoted to agriculture is of an excellent description, though somewhat limited in extent. It possesses fine plains for pastoral purposes; but its mineral productions are its chief sources of wealth. Its ranges contain gold, silver, iron, copper, lead, etc. Its coal is of an excellent description, and the mines afford employment to a number of miners. Nelson is the capital and chief port. It has also two others, viz., Collingwood and Westport, and there is also an excellent harbour in D'Urville Island, Port Hardy. For returns see Nelson and Westport. The population of the whole district in 1878 was estimated at 25,630.

MARLBOROUGH, situated on the north-east part of the South Island, is bounded on the north and east by the sea, and on the west and south by Nelson. It has an area of about 3,000,000 acres. Wool, timber, and flax are its principal productions, and the district is rapidly increasing in importance. The imports in 1879 were £11,848. Its chief towns are Blenheim (the capital) on the river Wairau, Picton and Havelock at the head of Queen Charlotte and Pelorus Sounds—extensive sheets of water penetrating a considerable distance into the interior. Blenheim and Picton are connected by rail, the latter being the port of call for the Union Company's steamers. Gold, coal, and antimony have been found in the district. The climate is very equable. In 1878 the estimated population for the district was 7,700.

CANTERBURY is bounded on the north by the district of Nelson, on the east by the sea, on the south by Otago, and on the west by Westland. It includes an area of nearly 9,000,000 acres. Its rich plains are estimated to contain upwards of two million acres, a large proportion of which is good agricultural land, and all occupied. Inland from the plains the great range of Southern Alps, with peaks from 10,000 to 14,000 feet high, bar the way of the husbandman. Canterbury is noted for its grain, potatoes, etc. In February, 1880, there were in four of the principal counties no less than 133,569 acres in wheat, estimated to yield 3,681,955 bushels of grain; and 4,723 acres in potatoes, estimated to produce 33,114 tons. Large areas were also under oats, barley, grass and other crops. The pastoral system however up to the present far predominates, and from its extensive runs in 1878 nearly 16,000,000 lbs. of wool were exported. For the first six months of 1880 the exports were: Wool, £466,529; wheat, £453,955; flour, £19,787; barley, £30,166; oats, £22,289; potatoes, £7,396. Extensive seams of coal exist along the foot of the ranges. Limestone (marble) and building stone of different sorts are found in several places, also manganese, copper, fireclays, quartz sands and clay iron ore. Flax is also exported. This district has rapidly increased in prosperity, its facilities for transport being naturally easy, and its railroads now run from north to south, and extend in radiating branches through all the chief agricultural areas. The journey from Christchurch through Canterbury and Otago to the extreme southern point of the island may be made by rail. The capital is Christchurch, some nine miles by rail from Lyttelton, the port of the district. (See Lyttelton). Timaru further south is also a port of considerable importance. In 1878 the estimated population of Canterbury was about

94,000. The imports in 1879 amounted to £1,697,843 and the exports to £1,389,230.

OTAGO, the most southern district, contains about 16,360,000 acres, of which upwards of 12,000,000 is estimated as agricultural and pastoral land. There are several large lakes inland, and extensive forests. It is the most populous of the Provincial Districts, having in 1878 an estimated population of 117,200. Its total imports were £2,970,050, and exports £2,112,890. In 1879 the imports were £2,896,885 and the exports £2,016,812. During the first six months of 1880 Otago exports included £107,059 gold; £724,041 wool; £70,256 wheat; £5422 flour; and £19,424 oats. It has every description of scenery, snow-clad mountains with lakes at their feet, wooded hills and cultivated vales. The climate is healthy and bracing, and may be said to be very equable. The soil, both as regards fertility and adaptability to culture, will compare favourably with that of any other country. As might be expected, its industries are numerous. It is rich in minerals, gold being first in value. "Otago Diggings" is a familiar phrase. Coal, ironsand and stone, copper, plumbago, cinnabar, and antimony. Its clays produce bricks and pottery. The building-stone of Oamaru—soft and easily worked, but said to harden with exposure—is being extensively used. Bluestone and granite are plentiful, as well as limestone. Fish is abundant on the coast. (Salmon, trout, etc., are being introduced all over New Zealand.) Port Chalmers (now called "the Port of Dunedin") is the chief port, and the city of Dunedin (the capital) is about 11 miles from the entrance. Its other ports are Oamaru, the Bluff, and Invercargill. A trunk railway, with several important branches, runs from end to end of the Provincial District, and Northwards to Christchurch.

WESTLAND, as its name implies, lies along the western side of the South Island. Extends from the Grey River at the North to Awarua on the South. Is bounded West by the sea, North by Nelson, East by Canterbury, South by Otago. Contains over 3,000,000 acres of land, the greater part of which is forest. In 1878 it had an estimated population of 16,965. Its chief ports are Hokitika, the capital and head-quarters of the goldfields, and Greymouth, its port for coal. The returns for 1879 give imports, £172,750; exports, £434,820. The district abounds with gold and other minerals, and has timber in illimitable quantities. The only real drawback to the district is the shifting bar entrances to each port. There are two anchorages—at Bruce's and Jackson's Bays.

The following is a short account of the chief ports and towns in the South Island:—

NELSON is the capital of the Provincial District of the same name. It is said to have one of the finest and most equable climates of any part of New Zealand. The city is built inside the Boulder Bank at the South-east end of Blind Bay, on a piece of land said to be between 70 and 80 acres, which slopes gently towards the harbour. It is partly surrounded by hills, and its scenery is very beautiful. The town is well laid out, and possesses some substantial buildings, such as the Provincial Government Buildings, the College, etc. The port is about $1\frac{1}{2}$ miles from the city, with which it is connected by a tramway. The railway, which extends 20 miles into the country, also runs down to the wharves. It is one of the regular places of call for the coastal and intercolonial steam services. There are several important industries here. The returns for 1878 give—Vessels: Inwards coastwise, 1,370; foreign, 20. Its imports amounted to £233,065; its exports to £15,632, among which are—Gold, £9,540; hides, £375; flax, £680; plants, £415; potatoes, £1,806; grass seed, £640; wool, £680. The imports for 1879 were £242,203; exports, £69,518.

PICTON is the principal port for the Marlborough District, and is connected with Blenheim—the chief town—by rail. It is situated at the head of Queen Charlotte Sound, and is the port of call for the steamers. The population in 1878 was about 3,000.

LYTTELTON, the principal port for the Canterbury District, is situated at the north-west end of Bank's Peninsula. It runs about seven miles in a south-westerly direction, and is about a mile wide. The town of Lyttelton is situated on the north shore about four miles from the heads, and is connected with the city of Christchurch by rail, over which the exports of the

greater part of the district are conveyed to the port. The returns for 1878 give the population of Lyttelton at 3,476. The entries inwards coastwise, 1,505; foreign, 190. The exports—which represent the main part of the district—were £1,712,874, of which some of the principal were—Wool, £910,068; tallow, £58,654; bacon and hams, £12,000; potatoes, £28,500; preserved meats, £21,600; grain, £305,350; gold, £228,220; flour, £28,500. The imports for 1879 were £1,579,061; exports, £1,279,622. Since the Harbour Board was constituted in the beginning of 1877 extensive improvements have been in progress. The harbour being somewhat exposed to east winds, a secure inner harbour has been formed by the construction of two breakwaters, with an entrance between, formed of rubble, faced seaward with huge blocks of stone. The eastern, or Officers' Point breakwater, is some 2,010 feet in length, 40 feet wide on top, and 6 feet above high-water mark. A timber breastwork is built nearly along its entire length on inner side, called Gladstone Pier. The western, or Naval Point breakwater, is 1,400 feet in length. The area of water thus enclosed is 110 acres. Dredging operations (see Sailing Directions) have been carried on for the past four years. The depth of water inside the breakwater and at the wharves varies from 23 to 16 feet at low tides. The rise is 7 feet, and vessels up to 2,700 tons can be safely berthed at the wharves. The following is the berthage space:—Gladstone Pier, 1,740 feet; timber breastwork from Gladstone Pier westward to Naval Point, 3,850 feet; Screw-pile Jetty, 1,030 feet; No. 1 Intermediate do., 800 feet; No. 2 do. do., 800 feet; No. 3 do. do., 800 feet; Tunnel Mouth Jetty, 440 feet; Peacock Jetty, 800 feet; making a total of 10,260 feet, capable of berthing 20 ocean ships and steamers, 20 barques and brigs, 6 intercolonial steamers, and 20 coasters, etc. This berthage is capable of very considerable extension by construction of additional jetties. The whole have lines of rails laid down on them, and are worked by the railway. No charge is made for wharfage on ships, but on all goods it is 2s. per ton. The Graving Dock is to be capable of taking in a first-class ironclad. Its dimensions are—Length on floor, 400 feet; width on floor, 46 feet; width on top, 82 feet; at entrance, 62 feet; depth on sill at high water, 23 feet. A cable is laid across the harbour a quarter of a mile within the heads to the Pilot Station at Adderly Heads (for which see Sailing Directions). There is a tug-boat, belonging to the Harbour Board, by which towage is very reasonable. A time-ball is dropped daily, except when blowing hard.

AKAROA, at south-east end of Banks' Peninsula, is a magnificent port, affording secure and land-locked anchorage to any number of vessels, and easy of access in moderate weather. (See Sailing Directions.) It was for many years the favourite resort of whalers. The town is divided into two portions, upper and lower. A railway to connect it with the main line is in contemplation.

TIMARU, at the south-west extreme of the Ninety-mile Beach, about 100 miles from Christchurch, is an important shipping port for the southern part of the Canterbury District. In 1878 it had a population of 7,222. Its entries inwards coastwise were 144; foreign, 27. Its exports were £41,580, of which wheat amounted to £40,066. The imports in 1879 were £117,932; exports, £109,616. The trade and importance of the district are rapidly increasing and the railways connect it with Christchurch and Dunedin. It is a port of call for the coastal and intercolonial steamers. Cargo hitherto has been taken off in large surf-boats, but a breakwater is now being constructed which is to extend for 1,000 feet out to the eastward, thence 1,000 feet at right angles to the northward. Some 1,200 feet is expected to be finished by the middle of 1881, 700 feet being already completed, with 18 feet at the end. There will be 20 feet at low-water springs inside the last 1,000 feet. A wharf is building where vessels can lie and discharge (in moderate weather), and mooring-buoys (for steamers only at present) placed inside the breakwater. Lights will be placed on the east and north points when completed. A pilot can always be obtained, and there is an efficient rocket-brigade always in attendance near the lighthouse on the approach of and during bad weather. The lighthouse, 30 feet high, is situated in the town. Timaru possesses several fine public buildings, churches, etc., a salubrious climate, and some beautiful scenery.

OMARU, at the extreme north of the Otago District, is rapidly rising into importance. Its population is about 6,000. Its entries inwards in 1878

were 351 coastwise and 18 foreign, and its exports amounted to £101,000, chiefly wool and grain—viz., £50,800 of the former and £42,200 of the latter—as well as £7,150 flour. In 1879 the value of the imports was £84,300; exports, £73,566. Oamaru is the shipping port of the largest pastoral and agricultural districts of the Provincial District of Otago. Its building-stone is unrivalled, and can be had in any quantity. Limestone, cement, pipeclay, and coal also exist. It has many handsome buildings, and the line of railroad passes through it. A substantial concrete breakwater is being carried out to a distance of 1,800 feet in a northerly direction from the Bluff; 1,200 feet is already completed. A mole of 1,700 feet, to run in an easterly direction, is also to be constructed, which with the breakwater will enclose a basin of 60 acres in extent, forming a safe harbour, which it is proposed to deepen to 20 or 24 feet, so as to admit a large class of vessel. Wharves have been built and moorings laid down, and vessels of 600 tons register have loaded for home ports. At present vessels drawing over 13 feet have to lie at the outer anchorage, one mile off the breakwater, in 5 or 5½ fathoms, till lightened sufficiently to be brought in to the wharves, where they discharge into and load from the railway trucks with steam cranes. There is 4½ and 4¼ fathoms from half to quarter of a mile outside the breakwater. Dredging will probably be necessary for the port within this if vessels of large tonnage are to load in the basin. The lighthouse is on the Bluff, and a green light is shown at the end of the breakwater works.

The port of DUNEDIN (formerly PORT CHALMERS) is a bar harbour, with 16½ feet on it at low water, and extends within the entrance to the south-westward for some 11 miles, forming a spacious sheet of water, at the head of which stands the city of Dunedin, the most important commercial city in New Zealand. The town Port Chalmers is at the head of Koputai Bay, one mile eastward of the middle islands, which lie seven miles within the heads, and is connected with the city of Dunedin by rail. Here there is good anchorage for large vessels in 5 fathoms, their cargoes being conveyed to Dunedin by rail or lighter. A channel has lately been cut with 18 feet in it so as to enable the largest vessels to reach the Dunedin wharves, for which a steam tug is necessary, and is always obtainable. The railway wharf is 1,000 long, and vessels of 2,500 tons have been discharged at it. There is a substantial graving-dock at Port Chalmers, 328 feet in length, 50 feet wide at the gates, with a depth of 19 feet water on the sill at high water spring tides. In connection with the dock is a workshop, fitted for repairing machinery and boilers of large ocean-going steamers, and a steam hammer capable of welding a 15-inch shaft. There is also a floating-dock and a patent slip, both capable of taking vessels of 600 tons. An extensive system of harbour works is in contemplation at Dunedin, which includes wet-docks, etc. There is a time-ball at noon. The city is well laid out, and possesses many handsome buildings, such as Government Offices, Custom-house, Hospital, etc., and, as might be expected, there are many important industries here. Its railroads are extending in every direction, connecting it with Christchurch on the north; the Bluff, Invercargill, and Riverton to the south. From Invercargill a line is carried inland to Kingston, on the Wakatipu Lake. The city is the central point of 417 miles of railway open for traffic in Otago, and is connected with the Canterbury system of 316 miles. Dunedin is the head-quarters of the New Zealand Shipping Company, and of the Union Company's fleet of steamers, and is one of their principal ports of call. It has a large trade with Melbourne. The population of city and suburbs is 35,000; of Port Chalmers, about 5,000. The number of vessels inwards coastwise in 1878 was 951; foreign, 161. The exports were £1,619,954, of which the following were the principal, viz.:—Wool, £902,280; gold, £464,265; grain, £99,680; preserved meats, £35,344; tallow, £26,135. The imports in 1879 were £2,598,238; exports, £1,600,449.

BLUFF HARBOUR, at the southern extremity of the island, in Foveaux Straits, was formerly a large whaling station. Is now the first port of arrival and last of departure of the steamers which connect at Melbourne with the Suez mail steamers. Campbelltown stands at the foot of the Bluff, on the south side of the harbour. It is the port for Invercargill, with which it is connected by railroad, 20 miles. The returns for 1878 give the population of the Invercargill district at 3,761. The number of shipping coastwise, 234; foreign, 76. Its exports at £391,970, wool being the principal

one, viz., £277,254; gold, £43,770; grain, £20,000; rabbit skins, £30,179; preserved meats, £10,224. In 1879 the imports were £206,539; exports, £342,347. The anchorage is narrow and confined, and the tides run very strongly. (See Sailing Directions.)

WESTPORT, on the Buller River, which has a bar entrance, with an average depth of 14 feet on it at highwater springs, and 12 feet at neaps, is easily entered when the weather is suitable, also at night time; but during the heavy freshes to which the river is subject, from October to February inclusive, only steam vessels of good power should attempt it. The bar is liable to change with the freshes and with westerly gales. There is anchorage in the roadstead, with good holding ground in any suitable depth. (See Sailing Directions.) Westport has a population of about 1,000. Its principal export is gold, of which in 1879 the export was £78,501. The number of vessels entered inwards coastwise in 1878 was 294; foreign, 3. The imports in 1879 were £31,450; exports, £639.

GREYMOUTH, on the Grey River, is the centre of considerable business. Coaches leave daily for the inland towns, and there is constant steam communication with adjacent ports and Nelson. The Melbourne steamers call off this port. Its chief wealth lies in its coal. There is a short line of rail from the port to Brunnerton. The Grey coal is estimated to be about the best in New Zealand. The population of the Greymouth Valley in 1878 was estimated at 10,244. The shipping inwards were 401 coastwise; foreign, 14. The exports were £169,923, chiefly gold, £161,960; also coal, £3,287. The imports in 1879 were £105,054; exports, £223,364. The drawback to the district is the bar entrance. As the channel often changes, particular attention must be paid to the semaphore, beacons, etc. (for which see Sailing Directions.) A stone breakwater is in course of erection on the south side of river, and when completed in accordance with Sir J. Coode's plan it is estimated that there will be 12 or 13 feet on the bar at low water. Anchorage in offing in from 10 to 15 fathoms good holding ground.

HOKITIKA, the capital of the Westland Provincial District, had in 1878 a population of 8,984. Its shipping returns give 193 vessels coastwise, and 13 foreign. Its exports amounted to £159,527, of which £151,420 was gold; its other productions were wool, hides, and tallow. Imports in 1879, £67,696; exports, £211,456. It is a large town, and essentially a mining one, and steadily increasing in importance. Extensive works, as recommended by Sir J. Coode, are in progress, and, although only partly finished, have already done much towards the improvement of the port, the tidal area having increased over two-thirds during the last twelve months. Until these works are finished no permanent directions can be compiled. Strict attention should be paid by vessels entering to the semaphore arms (for which and position of beacons, etc., see present Sailing Directions).

Sailing Directions.—New Zealand.

GENERAL SIGNALS FOR ALL NEW ZEALAND PORTS.

THE following *General Signals* are used at all New Zealand ports. (There are *Special Signals* for such places as the Maukau, etc., which will be found in their several places.)

TIDAL SIGNALS.

Flood tide—Two balls vertical at masthead, not less than six feet apart.
 Last quarter flood—Three balls vertical at masthead, with not less than six feet between each.
 Ebb tide—One ball at masthead.

BAR OR DANGER SIGNALS.

Bar Signals will be distinguished by their being arranged *horizontally*.
 Wait for high water.—A ball at each yard arm, and one on mast half the length of the yard below the yard.

Stand on; take the bar—Four balls horizontal on the yard, two on each side the mast.

Bar dangerous—Three balls horizontal on yard, two on any one side of mast, and one on the other.

Put to sea—Two balls horizontal on yard, on either side the mast.

NOTE.—Semaphore arms are to be used for piloting vessels over all bars where a pilot establishment is maintained, when pilots are not put on board, and the vessel being piloted is to be steered in the direction towards which the semaphore arm is pointed. When the semaphore arm is dropped, the vessel is to be kept steady as she goes.

Manukau harbour having several channels, special regulations have been issued by the local authorities for the guidance of vessels frequenting that port; and strangers are cautioned against attempting to enter without a knowledge of these local regulations.

Signals to be made from vessels entering or in harbour as required :—

Exempt from pilotage—White flag at the main.

Pilot required—Union Jack at the fore.

Steam tug required—Telegraph flag at the peak.

Mails on board—Commercial telegraph flag at the main.

Health or boarding officer wanted—No. 8 of commercial code at the main.

Gunpowder on board—Ensign at the mizen.

Medical assistance wanted—Union jack over ensign at the peak.

Customs boat wanted—Union jack at the peak.

Clearing officer wanted—White flag at the fore.

Police wanted (by day)—Ensign at the main.

Police wanted (by night)—Two white lights vertical at the peak, or at the same height where they can be best seen, four feet apart.

In addition to the above, every pilot station is to be provided with a set of the commercial code of signal flags, which will be used as required.

NIGHT SIGNALS FOR OPEN ROADSTEADS, ETC.

From Shore.

A boat will come off—Two white lights, vertical (as to a steamer coming in.)

Boat cannot put off—Two lights vertical, upper *red*, lower white.

Wait till daylight; boat will put off then, weather permitting—Two lights vertical, upper white, lower *red*.

Keep to sea; put to sea—Two white lights, horizontal, with a red light between them, to be used for vessels approaching or at anchor.

From Vessels.

Will wait till daylight—Two lights vertical, upper white, lower *red*.

Cannot wait—Two lights vertical, upper *red*, lower white.

Cannot keep to sea; put to sea.—Two white lights, horizontal, with a green light between them.

NORTH ISLAND.—EAST COAST.

The **Three Kings** are a cluster of islands lying 38 miles W.N.W. of Cape Maria Van Diemen, which forms the N.W. point of the North Island of New Zealand. Cape Morton Jones, the N.E. extreme, is in $34^{\circ} 6' 20''$ S., $172^{\circ} 9' 45''$ E. The principal one is 995 feet high, and may be seen 25 miles on a clear day. The other two are about equal in size and height, and are about a quarter of a mile long. Off the western end of the western island adjoining are several high rocks, which, at a distance of seven or eight miles, have the appearance of separate islets. The group extends about seven miles in an E.N.E. direction. There is an uncovered rock (Farmer's Rock) about three-quarters of a mile off the eastern side of Great Island. Vessels may pass on either side of the group. The landing is uncertain and dangerous at all times. There are strong tides and races between the group and the mainland. Formerly vessels were recommended to make the Three Kings, and pass to the north of them; but now that a good light is shewn at Cape Maria Van Diemen there is no longer any necessity for this,

except (in so far as the caution given in the "New Zealand Pilot" about avoiding the tides and races mentioned above holds good) for sailing vessels without a commanding breeze. The passage between the group and Cape Maria Van Diemen is otherwise free from danger. It is not advisable to approach any part of the group within two miles. There are some good springs of fresh water on them.

Cape Maria Van Diemen, the N.W. point of New Zealand, is a projection from a sandy isthmus, appears like an island from the seaward, and is 420 feet high. Immediately north-west of it is a double islet, but with no channel between. On this islet the lighthouse is built, a wooden structure 330 feet high; the light is *white*, revolving once in a minute, and is visible 24 miles. There is also shewn a *fixed red* light over the Columbia reef, which extends two miles to the westward of Cape Reinga, with the sea continually breaking on it. Coasting vessels occasionally pass inside the reef. S.S.W. $\frac{1}{2}$ W., six miles of Cape Maria Van Diemen, is the Pandora Bank of five fathoms, hard sand; it is steep-to, and the sea generally breaks on it.

Cape Reinga lies N. by E., four miles from Cape Maria Van Diemen. It forms one extremity of a cliff which terminates about nine miles to the eastward in a conical hill, whence the coast is lined by a sandy beach called Spirits Bay to about the middle of the northern side of the island. From Cape Reinga to Hooper Point, at the N.E. extreme of Spirits Bay, is E. by N. 10°. There is a rocky islet close off it, and the land immediately over is 1,000 feet high. The coast hence to the North Cape is rocky, alternating with sandy bays, and its general aspect is that of steep cliffs undermined by the sea, and their summits terminating in a sort of even table land.

Tom Bowline Bay lies about six miles eastward of Hooper Point. It is the northern beach of the sandy neck which connects the North Cape with the mainland. Whalers have found a temporary anchorage here, but it is very open and exposed.

North Cape—a bold, cliffy table land, trends E.S.E. $2\frac{1}{2}$ miles from 1 mile N.E. of Tom Bowline Bay—terminates in a peak about 790 feet high, and may be seen eight or ten leagues off.

Moudi Motou, a small peaked islet, lies off the N.E. extreme, and is connected with it by a ledge of rocks. Foul ground extends N.E. by E. $\frac{1}{3}$ rd of a mile from the islet, with a rock which is only uncovered at low water at the extreme end. The bays within the North Cape offer anchorage in from five to twelve fathoms in moderate westerly weather, but the back swell rounding the North Cape would render them bad anchorages in strong breezes. A site for a lighthouse has been reserved at the North Cape. In the fairway between the Three Kings and the North Cape a north-easterly current may be expected, especially with westerly winds; but within this limit more regular tides.

Parengarenga Harbour.—From North Cape islet the coast trends south six miles to Kohau or Coal Point, a black water-worn bluff, by which the entrance is easily distinguished, the outer north point of Parengarenga harbour, and which bears N.E. from the inner north point of the river. Its southern point (Fox) is a spit of dazzling snow white sand, which stretches towards Mount Camel along the coast. Parengarenga is a bar harbour, and has a shoal sandy spit extending from either entrance point; the northern spit runs from Coal point south-easterly for one mile, with nine feet water on it; the southern spit extends from Fox point in an E. by N. direction, and has less than one fathom. The channel lies between these spits, and is nearly a quarter of a mile in width, with 15 feet at low water on the bar (which generally breaks) deepening to five fathoms. To enter bring the outer extreme of Coal Point to bear N.W., and at a little more than one mile distant from it, when the depth will be 10 fathoms; when—being guided as well from aloft—a vessel should steer West, or for the inner north entrance point, until a low sandy point on the south side of the river, $1\frac{1}{2}$ miles inside Fox Point, is in line with Koti Kau, a cliffy point 20 feet high, nearly a mile beyond the low sandy point, bearing W.S.W. This course will lead to an anchorage in seven or eight fathoms, $1\frac{1}{4}$ miles inside

the entrance, close to Otehi point on the north shore; from this point the harbour branches into three creeks, the southernmost of which is the deepest. (See Plan).

Great Exhibition Bay is a straight sandy beach running S.S.E., nearly eleven miles from the south point of Parengarenga, terminating in a clifty point named Paxton; the soundings off this part of the coast are regular in from 12 to 16 fathoms sandy bottom, at one and two miles off shore. From Paxton Point to Granville Point the coast trends S.E. by E., seven miles; immediately to the north of the latter point is Henderson's Bay, a sandy beach two miles in extent; off this point also are two small islands—Simmond's Islands—bearing north, a half-mile and one mile distant from it. Granville point is the western point of Rangaounou Bay, which lies between it and Cape Kara Kara, the north-west extreme of Doubtless Bay. South of Granville Point is a sandy bay, one mile in extent, where anchorage may be had with off-shore winds in nine fathoms; but preferable shelter is to be found in Ohora Bay, a mile to the southward. Mount Camel, an isolated hill, 820 feet high, lies immediately over the southern side of Ohora Bay. Between these two bays are two rocks awash, a quarter of a mile from the steep clifty shore.

Ohora Bay is clear of dangers, and a snug anchorage, where a vessel may ride out any westerly gale varying from north to south, in seven to five fathoms.

ANCHORAGE.—If on reaching the neighbourhood of the North Cape from the southward a vessel should meet with a north-west gale, instead of contending against it she might proceed to Ohora Bay. Mount Camel is an excellent guide, being the only eminence of that height on the coast for many miles.

Ohora River.—South-westward, nearly one mile from Ohora Bay, is the river of the same name, which on the approach of a north-east gale might be entered by vessels not drawing more than 15 feet of water by keeping the high land on the north shore on board within half a cable, steering on a west course, until a small round islet, Motu Otuna, $1\frac{1}{2}$ miles inside the entrance, is seen just opening to the left of Tokoroa islet, bearing W.N.W. Vessels should moor well over on the north shore soon after passing the south sandy point, with the summit of the mountain bearing N.W. (See Plan.)

CAUTION.—The channel in is rendered very narrow by a sandspit, which runs half a mile south-eastward from the southern point; the space for anchorage is small, and the tides run rapidly; the Ohora River should therefore be only run for under favourable circumstances, or on the approach of bad weather. From Ohora river a straight sandy beach, backed by low sandhills, trends E. by S. seven miles, and terminates in the western sandy entrance point of Rangaounou or Awanui River.

Cape Kara Kara forms the eastern point of Rangaounou Bay. Westward of it the Moturoa islets extend for three miles. Deep channels exist through these islets, and between them and the main, with sunken rocks in them, on which the sea only breaks occasionally. South-west of Cape Kara Kara is the sandy bay of the same name, four miles in extent, with 10 and 12 fathoms water across. On its south-western point is a flat-topped hill, Pubeki, 300 feet high, which is a good guide to Rangaounou or Awanui river, being $2\frac{1}{4}$ miles eastward of its eastern head.

Rangaounou Bay extends 12 miles from east to west, and is 6 miles in depth. Across its entrance there is from 20 to 25 fathoms water, and 10 fathoms within one mile of the shore; the river Rangaounou or Awanui lies in the depth of it. (See plan.) The eastern head of this river, Blackney Point, has some rocks above water, stretching half a mile to the north-west of it—Motu Tara and one two-thirds of a cable off it awash. This head bears from the outer Moturoa islet (which latter may be rounded close) S. by W $\frac{1}{4}$ W., $6\frac{1}{2}$ miles.

The following directions are mostly taken from the chart, and from local information; and partly from "New Zealand Pilot," viz. :—S.W. $\frac{1}{2}$ S., three cables from Point Blackney, is the north point of Raupo Bay, whence the shore trends one mile S.S.E. to Te Kotiatia Point, with a projecting point

half way between in same line of bearing with two fathoms half a cable off it, but off Te Kotiatia Point (which has a flat-topped hill on it) rocky patches extend in all directions for one-third of a mile. A bank or spit extends one mile N.W. by W. from Te Kotiatia Point, with an average depth on it—from about four cables off the point—of $2\frac{1}{2}$ fathoms, which may be called the Eastern Spit. The Western Spit extends northward nearly two miles from the western sandy point of the river, with $2\frac{3}{4}$ fathoms on its end, and carries an average depth of $2\frac{3}{4}$ and $2\frac{1}{4}$ fathoms till within 4 or 3 cables of the point, when it shoals gradually; it forms the western side of the channel, and there is usually a break on it. The entrance to the river is between Motutara rocks and the N.W. or outer extreme of the Western Spit which bears W. by S. six cables from the rocks. A good mark for clearing the end of this spit is the Pubeki Hill (about two miles eastward of Blackney Point) open of Motutara rocks. Vessels entering should pass two cables outside Motutara rocks (for there is a sunken rock outside those seen dry) then steer S. by $\frac{1}{2}$ W., shoaling the water from 7 to $3\frac{1}{2}$ fathoms, not shutting in Blackney Point until the Peak near the end of the ranges to the south-eastward of Te Kotiatia Point (Mount Maunganui), opens of the point, which clears the N.W. end of the Eastern Spit—but vessels of light draught can steer to pass about four cables off Te Kotiatia, as mentioned above, across the spit in about $2\frac{1}{2}$ and $2\frac{1}{4}$ fathoms. When the point bears E. by S., haul up S.E. by E. $\frac{1}{2}$ E. (with the peak about $\frac{3}{4}$ point on port bow), passing half a mile off the point. Anchor with Te Kotiatia and the points north of it in line. Half a mile above this the flats and narrows begin, but coasters have been nine miles up. It is high water full and change in Rangaounou or Awanui River at 7h. 44m., rise 7 feet.

Matai Bay.—South-east of Cape Kara Kara, five miles distant, is Knuckle Point, the western point of Doubtless Bay. Matai Bay is midway between the two, and is divided by a narrow peninsula into two inner bays, Ohunga-hunga, and Waikate; the western, Ohunga-hunga, has the best anchorage, in five fathoms sand bottom; the eastern, Waikate, is full of rocks; the hills rising behind are remarkably red, and will point out Matai Bay. There is a rock in mid-entrance, just covered at high water, lying about one mile N.N.E. $\frac{1}{2}$ E. from Jolliffe Point; anchorage unsafe with N.E. winds.

Orurua Bay.—A small bay immediately to the north-west of Knuckle Point, with a rock in its entrance, bearing N.N.W. half a mile from the point.

Doubtless Bay is $5\frac{1}{2}$ miles wide at its entrance, and 8 miles in depth; its south-east point, Flat Head, which has a flat-topped islet lying immediately off it, bears from Knuckle Point, S.E. by E, $\frac{1}{2}$ E. six miles distant. When four miles within the entrance the bay opens out to a width of nine miles, and has a sandy beach of seven miles in extent on its western side; Monganui harbour is in the south-east corner, distant from the Flat Head Islet nearly five miles. The only dangers are the Albert Rocks, and the Fairway Reef, on its eastern side; the former are two rocks nearly two cables apart, well out of water, with 10 fathoms between them; they lie W. by S. $\frac{3}{4}$ S. $2\frac{1}{4}$ miles from the Flat Head Islet.

Fairway Reef is nearly one-third of a mile in extent, partly above water and partly awash; it lies S.W. $\frac{1}{2}$ W. four miles from Flat Islet, and $1\frac{1}{2}$ miles S.W. by S. from the Albert Rocks; there is a channel of more than a mile in width between these dangers and the eastern shore of the bay, and vessels bound to Monganui harbour from the eastward always pass inside them.

Monganui Harbour (see Plan) is $1\frac{1}{2}$ cables wide at the entrance, and carries an average width of nearly two cables for a distance of three-quarters of a mile in a south-east direction. It then expands into extensive mud flats, nearly dry at low water.

ANCHORAGE.—The least depth between the heads at low water is four fathoms, and they may be passed within fifty yards. Large vessels must anchor in the centre of the stream, and should moor. Four fathoms will be found three cables within the heads, the water then shoals to three fathoms, and deepens again immediately above some rocks which extend above water off the north shore little more than half a mile inside the north head and

about one cable off Butler's Point, a sunken rock with about 8 feet on it at low water lies about half a ship's length off their outer end. These rocks narrow the width of the channel to $1\frac{1}{2}$ cables. Above them is the best and most sheltered anchorage for a vessel going to make any stay. She should drop her anchor in $4\frac{1}{2}$ fathoms just after passing the rocks, and moor. Two cables above them the water shoals very suddenly. Coasters can lie just above this in 10 feet at low water. The signal-staff is on Gibraltar Point, about half a mile within the south head, on the south side of harbour, below the watering-place. The wharf is just above White's Point. The tides run in the harbour from two to three knots, and with north-west winds a swell sets into the entrance.

ROCK.—There is a rock above water a quarter of a mile off the west point of the bay, to the westward of the harbour, and one mile from the harbour's mouth. On either side of it, east and west, at the distance of nearly two cables, is a rock awash at low water.

Taipa River, three miles to the westward of Monganui harbour, is navigable a short distance for large boats. It has five feet at the entrance at low water. There is a rock above water off the mouth with three fathoms on either side of it.

Flat Head.—From Flat Head islet the coast trends east seven miles to the western head of Wangaroa bay. The coast is bold and cliffy. North-west of the west head of Wangaroa Bay, a quarter of a mile off shore, is a high rock (Cone Rock), with a smaller one out of water near it. There are seventeen fathoms close outside them, and in a bay two miles to the westward is a small high islet (Sugar Loaf), nearly a mile from the shore. There are no dangers about these rocks but what are visible.

Wangaroa Harbour and Bay.—(See Plan). The north head of Wangaroa Harbour bears S.E. by E. $3\frac{1}{2}$ miles from the western head of the bay, and S.W. by S. $\frac{1}{2}$ S. $2\frac{1}{2}$ miles from the south-eastern extreme of Stephenson's Island, which is a high, rocky island, $1\frac{1}{2}$ miles in length, in a N.W. and S.E. direction, tapering gradually at its N.W. extreme, it is an excellent mark for the Harbour, and affords considerable shelter to Wangaroa Bay; anchorage can be obtained in 9 and 11 fathoms anywhere between it and the shore. The land about the entrance of Wangaroa Harbour is high, with steep cliffy shores, particularly on the western side.

False Head, a remarkable straight bluff, is one mile to the westward of the entrance, and has two or three high rocks standing off it.

DIRECTIONS.—The harbour is through a narrow channel, one-third of a mile in length, in a north-east and south-west direction, the least width being about 250 yards; the shores are steep-to on either side, and may be approached boldly, there being 9 and 10 fathoms close to the cliffs. There is a beacon erected on the south head painted white, by which strangers will be guided to the entrance. The tides in the entrance run from one to three knots, and the wind is always baffling, unless blowing directly in or out; small vessels may easily work through with the tide, but the sea breeze, which is generally regular, blows directly through the passage, and large vessels should wait at anchor outside for it. Wangaroa is an excellent harbour when inside; the average width of its main branch, which runs in for more than two miles, is about a third of a mile; there are three bays on the eastern side which afford good anchorage, nearly out of the tide, the two outer ones in six and seven fathoms; but the most convenient anchorage, is in Kaouou Bay on the western side of the harbour, immediately inside the entrance.

Kaouou Bay.—There are two rocks in this bay nearly awash at high water, a cable apart, with nine fathoms between and deep water all around; the outer one bears from the inner western entrance point, (which is a small, rocky peninsula) W. by S. $\frac{1}{2}$ S., nearly four cables and from Middle Head, which is the south head of Kaouou Bay, N.W. by N., the same distance.

DIRECTIONS.—These rocks may be passed on either side; but it is recommended, after passing the rocky peninsula just mentioned, to steer to pass on their south side half a cable, anchoring in five fathoms, two cables above them.

ANCHORAGE.—This will be found an excellent anchorage, quite out of

the tide, and free from the eddies and irregular tides which prevail in almost every other part of the harbour, and which, together with the baffling winds, render the entrance to the bays on the eastern side frequently difficult and tedious for a sailing vessel.

CAUTION.—A shoal sand patch of 15 feet extends off Middle Head nearly two cables to the northward, but there is plenty of room for the largest ships between it and the two rocks described.

West Bay lies one mile westward of False Head, and affords shelter with westerly winds one-third of a mile off shore in five fathoms, within that the water is shallow. One mile N.W. of it is another sandy bight with a flat rock (Kava islet) two cables off the shore, having a depth of five and six fathoms between. One mile eastward of Wangaroa Harbour is a small river navigable for boats; off its west sandy point, a reef of rocks out of water extends a quarter of a mile; nearly one mile farther eastward are the Arrow rocks high out of water, with straggling rocks around them; they extend in a north-west direction half-a-mile from the shore, and should be given a berth of the same distance as the tides are strong. Nearly one mile again eastward is the eastern point of Wangaroa Bay, with an islet lying close off it. The flood stream on the coast sets to the westward, and the ebb to the eastward.

Flat Island is a low bare island, E. by N., nearly four miles from Stephenson's island, and is immediately off the eastern point of East Bay; it is half-a-mile in length from north to south; its outer extreme may be passed within two cables in twenty fathoms.

Cavalli Islands.—Eastward of Flat Island, four miles, is a group of small islands, extending nearly five miles from north to south, and more than two miles from east to west. The centre island or great Cavalli is nearly two miles in length north and south, and one mile from east to west; around its north and east sides, within a radius of $1\frac{1}{2}$ miles, are dispersed ten small islets, high, and having several rocks scattered among them, particularly on the east side; there are soundings 20 fathoms half-a-mile outside this group; off the western side of the Great Island, a quarter of a mile, is a rock high above the water; and one mile E.N.E. from Cavalli Island a sunken rock is reported to exist. The island next in size lies south-east of great Cavalli nearly a mile; it is a very remarkable steep rocky island, one mile long east and west; its summit rises in regular steps, whence called Step Island; between it and Great Cavalli is a cluster of rocks above water, and one sunken, with no safe passage between. It is high water F. & C. at the Cavallis at 8h. 0m., rise 7 feet.

Cavalli Passage is the channel between this group and the main land: in its narrowest part, which is abreast Step Island, the width is more than half a mile, and the least depth 17 feet at low water: in the centre of the channel, between Great Cavalli and the mainland, is a sunken rock with about six or eight feet on it at low water, which only breaks with strong winds from N.W. to N.E. A buoy was placed on it, but was washed away; it lies from the south-west end of great Cavalli, S.S.W. half-a-mile, and the same distance from the main, and may be passed on either side in six or seven fathoms: this is a safe passage for small vessels, and coasters always take it. In fine weather anchorage may be had for small vessels in the sandy bay on the south side of great Cavalli, sheltered by some rocks which extend off its western point, and also in Matauri Bay on the main land immediately westward of Step Island.

Tako Bay.—From here the coast trends south-east round Tako Bay eight miles to Ngatoka Rarangui Point, which has a high hill (Nipple hill) rising over it, and three rocks, the Needles, a short distance to the westward of the point. E.S.E., $3\frac{1}{2}$ miles from Ngatoka Rarangui Point, is Cape Wiwiki, the western Cape of the Bay of Islands.

Bay of Islands.—This extensive bay or gulf is comprised between Capes Wiwiki and Brett, and is eleven miles wide at its entrance; it lies E.S.E. 80 miles from the North Cape. The depth of water within the line of the outer capes does not exceed 40 fathoms, and there are few dangers that do not show themselves. The western portion of this extensive bay, commencing at Cape Wiwiki, will be the first described.

Cape Wiwiki.—This cape, the western entrance point of the bay, is a steep bold headland, its summit, Mount Pocock, being 843 feet high; it is dark coloured rising abruptly on its northern and eastern sides, with the southern slopes well wooded.

Galakek Island is a small island of moderate height half a cable off Cape Wiwiki, with a rock above water, a cable north of its eastern end.

The Nine Pin (*Tiki-Tiki*), a high black pinnacle rock, lies half-a-mile north-east of this island, with a passage between three cables in width, and twelve fathoms water; this remarkable rock is an excellent guide, and may be distinctly seen from a distance of twelve miles. One mile southward of Cape Wiwiki is Howe Point. Between Howe Point and the island Motu Roa, which is two miles further south of it, is the passage to the western anchorages of port Tepuna and the Keri-Keri river. Off the entrance to which and S.S.E., $\frac{3}{4}$ of a mile from Cape Howe, lies the Onslow or Howe Rock (with seventeen feet on it at low water), which is the only danger to be avoided. It is a pinnacle rock, with fifteen fathoms close to. The marks for it are the extreme of the peninsula between Capes Howe and the Wiwiki in a line with the low western neck of Galakek Island, N. $\frac{1}{2}$ W., and the extreme of Poraenui Point, bearing S.W. by W. $\frac{1}{2}$ W., a little to the north of Cocked Hat Island, a low triangular island $\frac{3}{4}$ of a mile beyond it.

Moturoa Island lies in an east and west direction, and extends off Toke Toke Point on the mainland for $1\frac{3}{4}$ miles. It is 220 feet high, and the channel known as Kent Passage, between its western extreme and the point, is two cables wide, with seven feet at low water.

Black Rocks.—Off the northern and eastern ends of Moturoa lie the Black Rocks, so called from their colour. They are a remarkable group of smooth flat-topped rocks, about 15 feet high, steep, and with no dangers about them.

Tepuna or Rangihoua Bay.—One and a half miles westward of Point Howe is Tepuna or Rangihoua Bay, with anchorage in five and six fathoms, sandy bottom, but it is open to easterly winds.

Tepahi Islands—Immediately to the westward of Rangihoua Bay are the Tepahi Islands, four ragged looking islands, with shoal water between. A round rock, well out of water, and nearly two cables in circumference, lies half a mile to the eastward of them; and between this rock and the west point of Rangihoua Bay, a quarter of a mile from either, is a sunken rock, which breaks at low water.

Poraenui Point, three-quarters of a mile to the south-west of the Tepahi Islands, is a long projecting point with an isolated hummock on its extreme. This point is three miles to the south-west of Howe Point, and is the northern entrance point to the western anchorages; Toke Toke Point, which bears from it S.S.E. one mile, and has a white sandy beach at its extreme, forming the southern. From Howe Point to this entrance there is a good working channel of nearly one mile in width in the narrowest part. The Tepahi Islands, on the north shore, and the Black Rocks, on the south, may be approached close, and there is anchorage between them, if necessary, in nine fathoms. When abreast Poraenui Point, Port Tepuna runs to the W.N.W., its entrance being between it and the middle point, which latter is W. by S. three-quarters of a mile from Poraenui; the Kerikeri River taking a westerly direction, and having the low stony triangular Cocked Hat Island lying in the centre of its entrance.

DIRECTIONS.—The directions for entering the bay from the southward will now be given:—Cape Brett: The summit of this cape is 1,220 feet above the sea, the highest land in the neighbourhood, and is one mile S. by E. of the extreme point. It rises abruptly from the eastern side, but slopes gradually to the northward, rising again at the extreme point to a high, round hillock. It makes like a quoin-shaped island, and is an excellent landfall for vessels approaching this part of the coast. Piercy Islet: N.N.E., quarter of a mile from Cape Brett, with a deep-water passage between, is high and bare, with a remarkable archway. There is a small rock off its south-west end. Steamers and coasters pass inside the islet. Bird Rock (black) is 25 feet high, and half a cable in extent, lies W. by S. one mile from Piercy Islet, with 40 fathoms close to. The Twins Rock is 13 feet

high, and about 100 yards round, lies S. by W. one mile from Bird Rock, is three cables from the nearest part of the coast, and three-quarters of a mile from the northern entrance point of Deep Water Cove. From Cape Brett the north-west face of the peninsula trends to the south-westward for over two miles to Deep Water Cove, in which the water is too deep for anchorage, unless within half a cable of the shore in a cove at its north-east end. The west extreme of Richard's Peninsula lies $1\frac{3}{4}$ miles south-west of the south head of Deep Water Cove. It extends nearly one mile east and west, moderately high, with a steep rocky islet off each of its three points to the eastward, westward, and northward. It is connected with the main by a low, sandy neck, about a hundred yards across. Orapukapuka Island is separated from Richard's Peninsula by the Albert Channel (the eastern entrance to the Rawiti, which will be noticed hereafter). It is the largest and easternmost of the group of islands which lie on the southern and eastern side of the bay. It is nearly $1\frac{1}{2}$ miles long from north to south. The islands of Otawaki and Okahi or Red Island lie immediately to the north-west of and in a line with Orapukapuka, with channels of one cable between them. The northern side of Okahi (the northernmost of the group) is a red, precipitous cliff, with a round red summit, known as Redhead, which will be immediately recognised on rounding Piercy Islet, from which it bears S.W. by W. $\frac{1}{4}$ W. 6 miles. Some rocky islets extend more than a cable off this head. Whale Rock is the only danger in entering the Bay of Islands from the eastward. It generally breaks at low springs or with any sea. There is a clear passage of four cables and twelve fathoms of water between it and Redhead, from which it bears N.W. by W. $\frac{1}{2}$ W. half a mile. Keke Island lies half a mile to the south-westward of the western point of Orupukapuka Island. It is the smallest of the group. Moturua is the next island to the westward. It has two steep cliffy islets, and a large rock above water off its north-west end, but they are free from any dangers. Motu Arohia, the westernmost of this group of islands, lies to the south-westward of Moturua, with a channel half a mile wide at its narrowest part between them, in which there is a rock always visible lying $1\frac{1}{2}$ cables off the west end of Moturua; leading into the Rawiti Tapeka Point, the northern extreme of Kororareka Peninsula bears S.W. $\frac{3}{4}$ West, two miles from the N.W. extreme of Motu Arohia, and S.S.E., nearly two miles from the easternmost black rock off Moturoa Island. Several detached rocks, well out of water, on which there is generally a break, extend nearly a quarter of a mile off it. They are all visible, and may be passed within half a cable in six fathoms. The following is partly from information supplied by Captain Baker, Harbour Master and Pilot at the Bay of Islands, and partly from the "New Zealand Pilot and Admiralty Chart." Vessels from the southward should round Piercy Islet from $\frac{1}{4}$ to $\frac{1}{2}$ a mile off, and then steer W.S.W. for 7 or $7\frac{1}{2}$ miles, which will take them about a quarter of a mile outside Bird Rock, and one mile outside Whale Rock, which will be passed when the channel between Red Head Island and the island westward of it is open; then steer S.W. by S., $5\frac{1}{4}$ miles, which will lead them abreast the rocks off Tapeka Point, distant a quarter of a mile; the east end of the Brampton Shoal (on which a buoy is to be placed)—a red cone buoy with staff and ball has been applied for—will then bear S.W., distant three-quarters of a mile. A vessel will then be off the entrance to Kororareka Bay and anchorage between Tapeka and Manawaroa Points. To enter with a leading wind keep a quarter of a mile outside the rocks off Tapeka Point—as also the next point to it—and off Kororareka Point, as off these points rocks lie scattered above water; steering from off Tapeka Rocks S. $\frac{1}{4}$ W. for about $1\frac{1}{4}$ miles, when the red light (at night time) on the end of the Government wharf at Russell will open out, bearing E. $\frac{1}{4}$ S., distant one mile. Then steer S.E. by E. $\frac{3}{4}$ E., and bring Kororareka Point to bear N., and the red light on the end of the wharf, N.E. and E. $\frac{1}{2}$ E., when good anchorage in $4\frac{1}{2}$ fathoms mud will be obtained; with the west end of Moturoa well open of the rocks off Kororareka Point. With Moturoa shut in, there is only fifteen feet water. The light on Russell wharf is visible between the bearings of west and south; it is elevated twenty feet above highwater mark, and can be seen in clear weather at a distance of two miles. The depth of water at the outer end of Russell wharf at low springs is fifteen feet, and gradually shoals to six feet 120 feet towards the shore. Russell

flagstaff is a good land mark, and can be seen from 18 to 20 miles off in clear weather. The harbourmaster and pilot is stationed at Russell. Manawaroa Point lies west $1\frac{1}{2}$ miles from Tapeka Point, but the channel is contracted to little more than half that width by the Brampton Bank, which extends more than $\frac{2}{3}$ of a mile off the low point of Manawaroa, and off which a low shelving projection dries a quarter of a mile from the shore at low water. From its outer or eastern end the Manawaroa Bank extends to the N.W. for over a mile, and to the S.W. for about a mile, to the S. point of Hume Creek. It has 6 to 15 feet on it, and breaks heavily with strong northerly or easterly winds. There is a clear channel between it and Tapeka Point. The extreme of the Black Rock in line with the outer extreme of Motu Galakek clears it $1\frac{1}{2}$ cables outside in six fathoms.

Working up for Kororareka anchorage, a vessel may stand to the westward until Observatory Islet (a rocky islet 60 feet high, off the south point of Kororareka Bay) is just opened out to the southward of Kororareka Point, when she will be in not less than six fathoms, and must tack to the eastward. This turning-mark holds good until the outer rock off Tapeka Point is in line with the south-west point of Motu Arohia bearing E.N.E.; and when this mark comes on, the outer clearing mark—that is, the outer extreme of the Black Rock not brought to the eastward of the outer extreme of Motu Galakek—must be taken up. This will be in the narrowest part of the channel; and when the north-west end of Motu Arohia begins to be shut in by Tapeka Point, the Brampton Bank stretches away towards Hume Creek, as mentioned above, where there is ample room for working. In standing to the eastward, towards the Kororareka peninsula on the starboard tack, keep good command of the ship ready for stays, as the eddy winds tend to strike off the high land and take her aback when close inshore. Hermione Rock is a patch with two feet water on it at low springs. It rarely breaks. It lies from the north end of Motumea Island N.W. by N. half a mile; from Kororareka Point S.W. by W. $\frac{1}{4}$ W. one mile, and off the shore four cables. The marks which clear the Brampton Bank lead very close to this rock; therefore do not bring the outer Black Rock to the eastward of the centre of Galakek Island when approaching this rock. Motumea, a narrow island, one-third of a mile long, lies off the entrance of Waitangi River. It has shoal water extending more than a cable to the eastward, and a reef of rocks $1\frac{1}{2}$ cables off its north end, the outer ones of which are covered. To the southward of a line from the south end of Kororareka Bay to Mr. Busby's house on the opposite shore at Waitangi, the water shoals to $3\frac{1}{2}$ fathoms; and there is also a bank, with 16 feet at low water, lying between Kororareka and Bay and Toretore Point. Waitangi River is S.W. $1\frac{1}{2}$ miles from Kororareka Point. Five feet is the least water at the entrance at low springs, and 12 feet inside. Small vessels enter this river, and can proceed a very short distance up. Pass either side of the Hermione Rock; with strong N.E. winds a swell sets into the river. Paihia village is in a sandy bay to the southward of Motumea. The small island Motuarahi, or Paihia Islet, lies about one cable off the south point of Paihia Bay. On the opposite shore is Toretore Peninsula, connected with the mainland by a narrow rocky neck, covered at high springs. Its extreme point lies S. by W. $\frac{1}{4}$ W. one mile from Observatory Islet. The distance between Toretore and Paihia Islet is four cables, and they may be said to be the entrance points to the upper anchorages. Pomare Bay is a deep bight, with from ten to sixteen feet water, between Kororareka and Toretore. Wahapu Bay is immediately above Toretore, with anchorage for vessels drawing eight feet water. Next to the southward is Pipiroa Bay, its south point is Okiato Point. Tapu Point, the next point above is $1\frac{1}{4}$ miles from Toretore, and is the north entrance point to the rivers Waikari and Kawakawa; on the western shore opposite Onieto Point is an excellent watering place. Waimangaroa Point is nearly three-quarters of a mile to the south-eastward of the watering place, and is a quarter of a mile to the southward of Tapu Point (which is on the opposite side of the channel), it is steep-to. The channel from Toretore to Tapu Point is nearly two cables wide with a depth of from six to nine fathoms, and the edges of the banks may generally be distinguished by the tide line; on the western side the sand banks dry at low water, and the bank is steep-to, shoaling from seven fathoms to a few feet. Vessels beating up should keep the Okiato and

Toretore Points both well open. Waikari River.—From Tapu Point this river trends to the eastward, and is navigable for coasters for $2\frac{1}{2}$ miles. Waikari Islet lies nearly two cables to the north-westward of Pah Point (on the south side of the entrance to the river and between it and the Kawakawa) on the edge of the bank. Ships may anchor a quarter of a mile above the islet, and about one cable off the Pah Point. Vessels leaving the wharf at Russell to proceed to lower loading ground with a draught of 15 or 16 feet should steer S.W. $\frac{3}{4}$ S. $1\frac{1}{4}$ miles (allowing for current, which runs strong when a heavy fresh is in the river) which leads abreast the *Black* buoy on extreme western edge of middle bank in $2\frac{3}{4}$ fathoms, leaving the buoy on the port side; then steer S. by E. easterly three-quarters of a mile, which will lead abreast the *Red* buoy, moored off the Haumi Mud-bank in two fathoms low springs, passing the island of Motu Arohia about one ship's length off on starboard side; then steer for the watering place on S.W. side of river where a *Red* beacon is to be placed, bearing from Tapu Point W. by N $\frac{1}{4}$ N. until you open out Tapu Point on N. E. side. Then keep in mid-channel until off the entrance of Kawakawa River on the starboard hand, when anchorage is obtainable (as above) in from four to ten fathoms. Vessels of smaller tonnage (not drawing over 11 or 12 feet when loaded) can proceed to upper loading ground at half flood. The entrance of the channel is on the S.E. side of the Kawakawa river, two cables length from Waikari Islet, when steer S. $\frac{3}{4}$ S., keeping about one ship's length from the beach until abreast of Canise Point (where the hotel stands), the beach runs off very steep; then steer for the Beacons on the Mud-bank, passing about half a ship's length off on the port side, when past the last beacon the anchorage in two fathoms is open out. Then apply to Capt. McLeod, who will point out the berth for discharging ballast. Russell is the only place in the Bay of Islands at present of any commercial importance. Ships requiring supplies or to refit must proceed to this anchorage, where they can obtain almost any stores they may stand in need of. The Kawakawa coal mines have been spoken of in the introductory chapter. There is a Resident Magistrate here. Masters of large steamers should bear in mind when approaching the wharf that at times when there is a heavy fresh in the river the current at the wharf sets along the shore in an opposite direction to that in which the flood or ebb tide is running. Strict attention to this will save much trouble, as you require to be smart with the quarter lines. It now remains to describe that portion of the eastern portion of the Bay which is sheltered by the islands (mentioned previously in the directions for entering the Bay from the southward), which extend six miles eastward of Tapeka Point. The extensive sheet of water between the islands and the mainland is called the Rawiti. It is capable of containing and affording shelter to any number of ships of the largest tonnage, but as it is not without its shoals a due attention to the chart will be required to avoid them. The southern shore of the mainland is cut up into deep and extensive bays and creeks. The western entrance to the Rawiti is between the western island (Motu Arohia) and Tapeka Point; it is more than $1\frac{1}{2}$ miles wide, with a depth of 14 fathoms. The only danger in this part is the Capstan Rock, which has 12 feet on it at low water and seven fathoms close round. It is exactly in line with Tapeka Point (from which it bears E. by S. $1\frac{1}{4}$ miles) and the east point of Paroa Bay (Kahuwera Point). It bears from the S.W. end of Motu Arohia S. by W. $\frac{3}{4}$ W. 1 and 1-10th miles, and from the west end of Honi-roa Bay N.E. by E. $\frac{1}{2}$ E. 6-10ths of a mile. Paroa Bay is $2\frac{3}{4}$ miles eastward of Tapeka Point, is half a mile wide at the entrance, runs to the S.E. for one mile, and has 17 feet at low water, just within the entrance point. This is a small vessel anchorage. It is not well protected from N.W. winds. The best shelter is in nine feet at low water on the west side of the bay. Manawaroa Bay lies immediately to the eastward of Paroa Bay; it runs to the south-eastward for two miles, terminating in Clindon Cove, which has only ten feet water a short distance within the entrance; there are also two bays on its eastern side, in which there is anchorage for small vessels. An extensive shoal extends from the western entrance point of Manawaroa Bay to the north-west (or directly towards the sandy bay at the eastern end of Motu Arohia) for one mile; the least depth on it at low water is thirteen feet, except on one small patch of seven feet, which lies S.W. $\frac{1}{2}$ W., half-a-mile from the N.W. end of Bateman Island, or with the high

summit of Mosquito Point, seen over the summit of that island, bearing N.E. and E. $\frac{1}{2}$ E. Vessels drawing not over eleven feet may avoid this patch by passing within a quarter of a mile of the west head of the bay, and can run into Manawaroa Bay at any time of tide, and anchor in either of the coves. Orakaua, the north-eastern one, is the best, and has $3\frac{1}{2}$ fathoms of water well within it. To clear the north tail of the shoal from the westward, keep the islet point, which is nearly one mile eastward of Mosquito Point, just open to the northward of it, which will lead one cable north of the shoal in four fathoms, or pass Motu Arohia at a distance of half-a-mile (a coral bank with fourteen feet at low water extends over a quarter of a mile south of its central part), until its eastern end bears N.W. by N., then steer S.E. by S. to pass half-a-cable off the N.W. low extreme of Bateman Islands (the outer limit of which lies about four cables to the W.S.W. of the N. point of the Manawaroa, on the eastern side of the entrance to bay), and when the knob or N.W. point of Orakaua Bay is on with the sandy beach of Opuna Cove, bearing E. $\frac{1}{4}$ N., haul up to pass the knob at the distance of half-a-cable in five fathoms, anchoring a quarter of a mile within. If bound pass Manawaroa to the eastward, keep the above mark on till the east end of Motu Arohia bears N.N.W., when the shoal with fifteen feet on its end will be passed. Continue on the same course—E. by N. $\frac{1}{2}$ N.—to pass a convenient distance from Mosquito Point, which is bold, close to. This course leads southward of the patch, with seventeen feet on it at low water, which lies E. by S., half-a-mile from the S.E. end of Motu Arohia (with $3\frac{1}{2}$ fathoms between them). For over $1\frac{1}{2}$ miles to the eastward there is now a clear space free from all dangers, with anchorage in from seven to eight fathoms. Poro Poro Island lies three or four cables to the south-westward of Orupuka Island, to the N.W. of the western end of the Albert Channel. S. $\frac{1}{4}$ E. half-a-mile from its low N.W. point is a sunken rock at the extremity of the shoal, running out from it. To clear this rock keep the centre south point of Motu Arohia, touching its eastern point, when a vessel will be two cables south of the rock in seven fathoms, and when the N.W. point of Poro Poro is on with a double rock which separates the two sandy bays on the west side of Orupukapuka, bearing N. $\frac{1}{4}$ W., she will be abreast the rock. (This last mark leads directly on it.) Parekura is the next bay eastward of Manawara, a little over two miles from it. It is one-third of a mile wide at the entrance, with six fathoms between the points. It runs to the E.S.E. for $1\frac{1}{2}$ miles. There is anchorage in four fathoms half a mile within, and nine feet at low water half a mile above this. Waipero Bay is a snug cove running to the S.W. immediately inside the western head of Parekura Bay, with good anchorage in fifteen feet at low water. Makiwi Cove, beyond Long Point, runs to the eastward for half a mile. It is very shallow and unsheltered, with a reef of rocks off its entrance awash at half tide.

A short account of the other channels into the Rawiti will now be given. The Eastern, or Albert, Channel is between Orupukapuka and Richard's Peninsula, its width not being more than a quarter of a mile. Small vessels rounding Cape Brett with a scant wind from the northward avail themselves of this passage, as they can obtain anchorage when inside it or work up in smooth water. Vessels in distress have also entered under the same circumstances. This channel should not be attempted unless with a leading wind and a steady breeze, and never by large vessels unless in cases of emergency. The Hope Reef lies from the S.E. end of Orupukapuka N. $\frac{1}{4}$ W. $\frac{1}{2}$ a mile, and is very dangerous. It is one cable in extent, awash at low water. The sea breaks heavily on it in bad weather. Two cables to the eastward of it, and in the fairway to the entrance of the channel, is a patch of 15 feet; and another rock, which generally breaks, lies in a line between Hope Reef and the island point, two cables from the latter. Immediately outside the reef are 14 and 15 fathoms. Two high cliffy islets, Round Islet and Te Ao, lie off the S.W. end of Orupukapuka, and two smaller ones with some rocks about them on the opposite shore. The bays within them to the eastward are shoal and rocky, and the islets must not be passed inside. These islets narrow the channel to a quarter of a mile, and a patch of foul ground, with 13 feet on it at low water, lies to the southward of Round Islet, in the centre of the passage. In the entrance between the S.E. point of Orupukapuka and the west point of Richard's Peninsula is another small patch of 16 feet,

which also lies exactly in the centre. There is anchorage for small vessels in a small sandy bay on the south side of Orupukapuka, immediately within the entrance point, which must not be rounded too close, as some rocks extend a short distance from it. The next entrance (from the eastward) into the Rawiti is between Red Head and Keke Islands. After rounding the former steer a mid-channel course for N.W. end of Poroporo, S.E. $\frac{1}{2}$ E. for $1\frac{1}{2}$ miles, until abreast and two cables off the eastern Flat Rock off the S.E. end of Keke, then south for a quarter of a mile across a belt with 16 feet water on it. When it is crossed, the water deepens to six and seven fathoms, and you will be in the Rawiti. If bound to the bays to the eastward, be careful to avoid the sunken rock S.W. of Poroporo already mentioned. The remaining passage to be noticed is between Moturua and Motuarohia, which is half a mile wide. Steer to pass to the westward of a rock above water, which lies $1\frac{1}{2}$ cables off the western point of Moturua, then in rounding the S.W. point of the latter, do not approach within two cables until the islets beyond begin to open, when you can haul into the Rawiti. Vessels will scarcely have occasion to take these last two passages unless with a leading wind, when both will be found easy. During the spring and fall of the year, strong west and south-west winds are prevalent, at times blowing hard for a period of three or four days. During summer months the sea breezes, viz., N.E., are the prevailing winds which last till towards sunset, suddenly hauling round south with fresh breezes. In the months of April and May strong gales from north to south-east are generally experienced, which cause the Brampton Shoals to break heavily, particularly on the ebb tide and with heavy freshes from the rivers. During the winter months, June, July, and August, dense fogs are prevalent after midnight, lasting till 9 and 10 a.m. Rise and fall of tides: Ordinary springs, six feet, and with strong easterly gales backing tide up, to nine feet.

VESSELS arriving off Cape Brett from the southward, with a south-west wind, are recommended to stand direct across for Cape Wiwiki and the Nine Pin, in preference to making short boards, as much smoother water will be found, and this wind frequently draws off the western shore and favours them, particularly towards the close of the day.

TIDES within the Bay of Islands are not much felt, except at the narrow entrance of the rivers, where they run from 1 to $2\frac{1}{2}$ knots per hour. In the Rawiti, one knot an hour is about their greatest strength, the flood running to the westward, and the ebb to the eastward. It is high water full and change at Kororareka at 7h. 15m.; rise of tide from six to nine feet.

FROM NORTH CAPE TO AUCKLAND HARBOUR.

Being abreast of the North Cape, distant two leagues from it, an E. by S. $\frac{3}{4}$ S.* course should lead ten miles outside Cape Brett, which may be seen in clear weather from 25 to 30 miles.

Poor Knights.—On rounding Cape Brett, the Poor Knights Islands (*Tawiti Rahi*) will be seen; these are two rugged looking islands, about 200 feet high lying close together, and extending in a north and south direction $2\frac{1}{2}$ miles; their north end bears from Cape Brett S.E. by E. $\frac{1}{3}$ E. 26 miles, and their distance from the nearest point of the main is 11 miles.

DIRECTIONS.—Steer for these islands, passing on either side; the water is deep—64 fathoms—and there are no dangers. Three miles S. $\frac{1}{2}$ E. of their southern extreme are three steep cone-shaped islets—the High Peak Rocks—and a fourth—Sugar Loaf Rock—of the same character, S. $\frac{1}{2}$ W. $4\frac{1}{2}$ miles; these islets can be seen at a distance of 10 or 12 miles; should the Poor Knights be passed on the outside at a distance of two miles, a vessel, when abreast of them, should steer S.S.E., which is a direct course into the Hauraki Gulf, and leads between the Moro Tiri Isles and the Moko Hinou and Fanal Islands, four miles from the former and eight from the latter.

The inshore course and distance from a berth two miles abreast Piercy Islet, Cape Brett, into the Hauraki Gulf is S.E. $\frac{1}{2}$ S. 30 miles, which will lead $3\frac{1}{2}$ miles off the Wide Berth Islands (south point of Wangaruru Bay);

* For nine months out of the twelve a vessel will find herself off the Poor Knights at daylight, from the offset from the coast; therefore, if the weather permits, and the coast is visible, the course should be regulated accordingly.—Captain Drury's Remarks.

inside the Poor Knights and Sugar Loaf Rocks, $g\frac{1}{2}$ miles from the latter, and will take a vessel abreast Tutukaka harbour, at a distance of about $4\frac{1}{2}$ miles. When abreast Tutukaka harbour, which will be known by three remarkable headlands called the three Gables, a course S. by E. $\frac{1}{2}$ E. 23 miles, will lead midway between Bream Head (*Tewara*) and the Chicken Group, and abreast the Sail Rock (*Toutourou*), taking care to avoid the McGregor Rock, which lies nearly midway between Bream Tail and the Sail Rock. (See page 56). The course is then S.E. for 25 miles to abreast Takatau Point, two miles distant, having passed Rodney Point within $1\frac{1}{4}$ miles. If it is intended to pass outside Flat Rock, which, when abreast Takatau Point, will be five miles distant, the same course will lead two miles clear of it; if inside S. by E. $\frac{1}{4}$ E. will be about a middle course between it and Kawau Island one mile distant from either, taking care to avoid the Nelson Rock, which lies $\frac{1}{2}$ mile off the south-eastern part of Kawau. (See page 5S.) A vessel passing inside the Flat Rock will take the Wangaparoa channel to Auckland Harbour, which bears from the south-east end of Kawau Island S. $\frac{1}{4}$ E. nine miles.

CAUTION.—In giving these inshore courses, it must be understood by the seaman that they are only intended for vessels passing down the coast under favourable circumstances, and when everything can be plainly made out; they are the courses usually adopted by coasters, and by those acquainted with the navigation, when running for the Hauraki Gulf or Auckland Harbour, with a fair wind.

Wangamomoo Harbour.—From Cape Brett the coast trends S. $\frac{1}{4}$ E. for 5 miles to the small harbour, Wangamomoo: the only danger between is a flat rock two feet out of water, which lies $1\frac{3}{4}$ miles south of Piercy Islet, a quarter of a mile off shore. Wangamomoo is the southern of two bays, somewhat similar in appearance when seen from seaward: the northern bay has several rocks scattered over it and is without anchorage. The north head of the harbour has an island lying directly east of it, and almost connected with the main. The southern head projects more than half a mile further to the eastward than the north head. The entrance is nearly half a mile wide, with 15 fathoms water; but to get secure anchorage a vessel must enter a small basin which runs to the south-west when $1\frac{1}{2}$ miles within the north head point, and the entrance to which is not two cables wide: it is a snug anchorage for small vessels in five or six fathoms.

Coast Southward of Wangamomoo.—The peninsula which forms the southern side of Wangamomoo Harbour extends $1\frac{1}{2}$ miles easterly from the main land, forming a bight on its southern side (which offers no shelter), whence the coast trends south-easterly $4\frac{1}{2}$ miles to Home Point, a remarkable flat topped point. Two clifty islets lie south of this point, at distances of a half and three-quarters of a mile respectively; they are about one cable in extent, and the same distance off shore.

Bland Bay is immediately to the westward of these islets; it runs in a westerly direction for $1\frac{1}{4}$ miles, and has a long sandy beach on its south-west side, which is the northern side of the neck, separating it from Wangaruru harbour; this neck is only 150 fathoms across. This bay is three-quarters of a mile wide at its entrance; it is useless as an anchorage, and a vessel should not stand in within the line of the heads.

Danger Rock, a black rock eight or ten feet high, lies one mile off Bland Bay, S.E. $1\frac{1}{2}$ miles from Home Point, and N. $\frac{3}{4}$ E. $2\frac{1}{2}$ miles from the north head of Wangaruru Harbour (Cape Home). It is steep-to and may be passed on either side.

Wangaruru Harbour (see Plan) lies in the north-west corner of a bay five miles in length, of which Cape Home is the north point, and the Wide Berth Islands the southern limit. It is a good harbour for medium-sized vessels, well sheltered, and easy of access.

Henry Island, off the entrance, bears from Cape Home S. $\frac{1}{2}$ W. four cables. A reef awash runs off its south end for a quarter of mile, affording considerable shelter with easterly winds. It may be passed on either side, when the Black Rocks—which extend a quarter of a mile southward from Grove Point, and the same distance off shore, with four fathoms half a cable off them—will be seen on the starboard hand. The anchorage for large

vessels is with Grove Point on with the end of Black Rocks N.N.W. $\frac{1}{2}$ W. and the middle of Henry Island east about $3\frac{1}{2}$ cables from Black Rocks and from Rugged Point. The passage south of Henry Island is the widest and best. Vessels entering Wangaruru Bay from the southward, after giving the Wide Berth Islands a berth of $1\frac{1}{2}$ miles, in 14 fathoms, should steer west till the rocks off Henry Island bear N. by E. about three cables, in not less than nine fathoms, then steer N.W. $\frac{3}{4}$ N. for Grove Point, and anchor as above. A more sheltered anchorage lies $1\frac{1}{4}$ miles above the Rugged Point, to enter which vessels drawing over 14 feet should steer to pass one cable outside the high islet half a mile above Rugged Point, as a bank with fifteen feet at low water extends nearly half a mile westward of Grove Point towards the islet, narrowing the channel to a little over a cable, with a depth of three and a quarter fathoms. When the islet bears south, steer N.N.W., or to the right of Hay's Island, when the water will deepen to four fathoms. Anchor abreast a sandy bay on the left hand, and Grove Point E.S.E. in four fathoms mud. Coasters drawing eight feet may go $1\frac{1}{2}$ miles above this; the channel is to the southward of Hay Island; there is a rock with four feet water N. by W. two cables from the north point of the sandy bay, and S.E. $\frac{1}{2}$ mile from the south-west point of Hay Island. There is sheltered anchorage for vessels drawing from ten to twelve feet, half-a-mile above Grove Point, and about three cables off shore, in sixteen feet at low water.

Mimiwanca Bay, in the south-east corner of Wangaruru Bay, is one mile in width at its entrance, and the same in depth. It lies S.E. $\frac{1}{2}$ E. four miles from Henry Island, and is open to the northward. Coasters anchor here with southerly winds; the best anchorage is with the east point of the bay, a cliffy point with three rocks off it, bearing north about four cables distant. N.W. $\frac{1}{4}$ N., a quarter of a mile off the point in the head of the bay, is a rock awash at low water.

Wide Berth Islands, a cluster of high rocky islets abreast the south head of Wangaruru Bay, extending from $\frac{1}{4}$ to nearly $1\frac{1}{2}$ miles off shore, with three reefs awash one mile to the southward of them. They should be given a berth for two miles, unless with a commanding breeze. From Wide Berth Islands to the north Gable, the coast trends S.E. $\frac{1}{2}$ S. for nearly eleven miles; indented with several bays, but without anchorage. Four islets lie a quarter of a mile off the shore, midway between Wide Berth Islets and Elizabeth Reef. They are steep to.

Elizabeth Reef is half a mile in extent, with its outer edge one mile from shore. It bears S.E. $\frac{1}{2}$ S., five miles from the outer Wide Berth Islet. The central part is awash at high water, the sea always breaks on it; there is a narrow channel with three fathoms between it and the shore; there are seven fathoms close to and twenty-two fathoms one mile off it.

Sandy Bay is immediately south of the Elizabeth Reef; it is three miles in length and $1\frac{1}{2}$ miles in depth. A rock awash lies $1\frac{1}{2}$ cables off the beach one mile to the southward of the north head. It is somewhat sheltered to the north eastward by the Elizabeth Reef, and temporary anchorage may be had in fine weather in six and eight fathoms.

Three Gables, three remarkable gable-shaped headlands, nearly a mile apart from each other, having bays between, which are rocky and unsheltered; the southernmost gable forms the north head of Tutukaka harbour.

Tutukaka Harbour—(See Plan)—is frequented by coasters. The north head is connected with the coast by a narrow sandy neck. S. by E. $\frac{1}{2}$ E. six cables from it is a cliffy islet extending two cables from the coast, with rocks off it in an E. by S. $\frac{1}{2}$ S. direction for two cables, the outer one is above water. This islet appears as the south head in coming from the southward, but the true south head is W.N.W. $\frac{1}{2}$ mile from it, off which a cluster of rocks, above water, extend towards the north head for $\frac{1}{4}$ of a mile. Between the outer rock (which is well above water) and the north head, is the passage in, one cable wide. Coming from the southward give the south head islet a berth of half a mile, and steer for the north head, pass between it and the entrance rock, with eight fathoms in mid-channel, when inside it opens out to two cables. Anchor two cables inside the rock in $4\frac{1}{2}$ fathoms, a quarter of a mile from Phillips Island, a high-wooded islet, which bears from the

entrance rock W. by S. half mile. This harbour is only fit for small vessels, larger ones would have to moor head and stern. The rocks at the entrance afford good shelter from easterly winds. There is 15 feet at low water one cable from Phillips Island.

Nongodo River—(See Plan)—lies in the north-west corner of a sandy bay $1\frac{1}{2}$ miles to the southward of Tutukaka. In this bay there is good anchorage with off-shore winds in six and seven fathoms sand; the river can only be entered in fine weather by coasters acquainted with the locality; it is very narrow, with a rock in the entrance, and carries a depth of five feet at low water for a distance of four miles within the mouth. The bay trends four miles in a S.E. by E. direction from Nongodo river, and terminates in a projecting point with a small islet lying close off it, which may be passed close in 16 fathoms. W.N.W. nearly a mile from this point is a rock awash, two cables' lengths off shore. From the projecting point the coast trends S.S.E. $8\frac{1}{2}$ miles to Bream Head (Cape *Tewara*); the first four miles is high and clifty, ending in a round hill; hence to near the Cape low sand hills; the high and rugged land of Bream Head rises immediately over it, and is easily recognizable by its sharp spiral-shaped peaks. N. by W., nearly one mile from the Cape, and two-thirds of a mile off shore, lies Bream Islet, which is low, and about two cables in extent. N.E. by E., three-quarters of a mile from the islet, lies Bream Rock (a dangerous patch of small extent), with sixteen feet on it at low water, bearing from the Cape N. by E., $\frac{1}{2}$ E., nearly $1\frac{1}{2}$ miles. Inshore, and from $1\frac{1}{4}$ to $2\frac{1}{4}$ miles north-westward of the Cape, are three rocky ledges.

Moro Tiri, or Hen and Chickens. The CHICKENS—which lie some $3\frac{1}{2}$ miles to the northward of the Hen—are a group of four islands extending five miles in an E.N.E. and W.S.W. direction, with some islets about three-quarters of a mile to the northward of the westernmost or smallest Chicken. A sunken rock lies nearly midway between the two western Chickens, which are one mile apart. Bream Head bears from the western one W. by N., five miles. The highest one is 725 feet high. They are bold to.

TARANGA—or the HEN—is 1350 feet high, with a remarkable double peak on its western end, somewhat resembling Bream Head; it is $2\frac{1}{2}$ miles long from east to west, and one mile from north to south; it is bold to. Totourou, or Sail Rock, lies S. by E. $\frac{1}{2}$ E., $2\frac{1}{2}$ miles from the S.W. extreme of the Hen, resembling a fore-and-aft schooner on many points of view. Midway between Sail Rock and Bream Tail lies McGregor Rock. (For description, see page 56).

Moko Hinou (on which it is proposed to place a light) and **Fanal Islands** lie 15 miles to the eastward of Moro Tiri Islands. The Moko Hinou lie to the N.W., and consist of three islands, about 250 feet high, lying close together in a N.E. and S.W. direction for about $1\frac{1}{2}$ miles. W. by N. $1\frac{3}{4}$ miles from the S. Western island is a smaller one lying N.W. and S.E. nearly half a mile in length, with rocks off each end. There are no dangers about this group but what are visible, with the exception of a sunken rock off the S.W. end of the S. Western islet (see chart). Fanal Island is E. by S. $\frac{1}{2}$ S., two miles from the S. Western Moko Hinou; it is about half a mile in length. Three-quarters of a mile N. by E. of it lies a long reef, half a mile in extent east and west, always above water. Navire Rock lies S. by W. $\frac{3}{4}$ W. three-quarters of a mile from the S.W. point of Fanal; and the Simpson Rock S. $\frac{1}{2}$ W. $2\frac{3}{4}$ miles. They are well out of water, and the latter may be seen three miles off.

DIRECTIONS.—Having passed the Hen and Chickens, the same course—S.S.E.—leads between Rodney Point and Little Barrier Island, nearly in midchannel, and three miles eastward of the Flat Rock. Vessels from the northward should pass inside or westward of the Little Barrier; but if obliged to pass to the eastward must beware of the Horn Rock, lying nearly midway between the Great and Little Barriers, bearing E. by S. $\frac{1}{2}$ S. from S.E. end of Little Barrier, distant four miles. It breaks when there is any swell.

Bream Head, the north point of Wangarei Bay, is a remarkable cape, 1,500 high, very rugged and craggy, with its summit resembling the

head of an animal, having two nipples or ears on it. S. by E. 11 miles from it is Bream Tail (Papai Outou), a bluff of moderate height, the southern limit of the bay, which is seven miles deep, with a sandy beach 10 miles in extent. There is anchorage in the bay with winds from north to south, by the west, in five and six fathoms sand, two miles off shore, and to the southward of the Mare Bank in its N.W. end.

Wangarei Harbour (see Plan).—From Bream Head the coast runs in a W. by S. direction towards the harbour, and is steep, with a continuation of the Bream Head mountain range rising abruptly from the sea almost to the same height for a distance of three miles, when it terminates in Busby Head, the east point of the harbour. To the eastward of Busby Head a high run in for half a mile, which is shoal, and should be avoided. Off the west pitch of Busby Head is a steep sugar-loaf cone (called the Frenchman), connected with it by a ledge. From this—which may be considered the entrance point—the coast turns directly northward, and at a distance of half a mile is Home Point, with a hill about 200 feet high over it. Round this point, in Calliope Bay, is the first (or small vessel) anchorage, and a vessel should only shoot round it sufficiently far for the protection from south-east swell, or about a quarter of a mile and $1\frac{1}{2}$ cables from the shore, as the distance from it to the Calliope Bank is scarcely three cables.

Calliope Bank is an extensive sand flat extending from Lort Point, the northern entrance point of the river, in a sweep, to within three cables of Home Point, and covering the whole of the bay, eastward of it, with the exception of a very narrow channel in shore for coasters. There is scarcely two feet on this bank at low water.

Sandy or Marsden Point, low, bordered with sandy hillocks ten to twenty-five feet high, on the S.W. side of the entrance to Wangarei River, lies N.W. by W. $\frac{1}{2}$ W. two miles from the Sugar Loaf, and half a mile to the southward of Lort Point, on the opposite side of the channel, which is between the Mare Bank, to the westward, and the Calliope Bank and Home Point to the Sugar Loaf, to the eastward.

The **Mare Bank** may be said to begin at Sandy Point, and sweeps round to the east and south-east, with a black buoy on its edge in six feet at low water, a little below Sandy Point, towards Calliope Bank and Home Point, and thence to the southward, narrowing the channel to about four cables off the latter and three abreast the former, until abreast Passage Islet, which is small and wooded, lying close above Lort Point. Nearly half a mile W.N.W. from this islet is the second or Passage Islet anchorage. Steamers call at Sandy Point on the way in and out. N. by W. three-quarters of a mile from Home Point is a small islet. It lies on the Calliope Bank, a quarter of a mile to the northward of its southern edge. N.N.W. $\frac{1}{2}$ W. from the same point $1\frac{1}{2}$ miles distant, and close to the north shore of Calliope Bay, is another higher and larger islet, which is used as a leading mark for the channel. As vessels forced into Wangarei harbour by stress of weather would seek either of the two anchorages just mentioned for shelter, it seems desirable, before noticing the upper part of the river, to give concise directions for passing through the narrows which lead to them.

DIRECTIONS.—Vessels entering Wangarei under such circumstances should be prepared to shorten sail, and anchor without delay, as the tides are strong, and running in with a fair gale of wind there is not much room for rounding to. A look-out from aloft is also desirable in a large vessel, as the edges of the banks will generally be easily distinguished. To enter Wangarei from the northward or eastward, and after rounding or passing Bream Head extreme, keeping half a mile off the shore, when the mountain (Bream Head) bears N. by W., steer W. by S., or parallel with the coast, for two miles; the Sugar Loaf off the west point of Busby Head will then bear N.W. by W. $\frac{1}{2}$ W., and the western sandy entrance point will be just open of it; observing, that in approaching Wangarei on this course the Sugar Loaf will not appear as detached from the Busby Head until the above marks are nearly on. When the above marks are on, steer immediately W. by N. $\frac{3}{4}$ N. (for nearly one mile) until abreast the Sugar Loaf, and two cables from it; when alter course to N.N.W. $\frac{1}{4}$ W., or for the left extreme of the high islet on the north shore of Calliope Bay (coasting steamers bring the saddle in Manaia

Peak a little to the eastward of High islet N.N.W., which is an excellent night mark; little more than half a mile on this course will lead abreast and two cables from Home Point, and abreast the first anchorage already described. If the second anchorage is preferred (and which is recommended for vessels of large size) pass Home Point from one to two cables off, and keep the mark given above on (Manaia Saddle, eastward of High Islet) until a saddle in the Bream Head mountain opens bearing, when alter course to the westward until it is right astern, steering to pass a little to the southward of Passage Islet (which is bold to), taking care to keep the islet on Calliope Bank open north of the saddle; anchor with the centre of Passage Island S.E. by E. about four cables distant, Darch Point bearing N. $\frac{3}{4}$ E. A vessel will then be about a quarter of a mile from the shore, and the same distance from the first *Red* buoy on the tail of the Snake Bank, in 12 feet at low water.

SOUNDINGS.—By following the above directions a patch of $4\frac{1}{2}$ fathoms (on which there is a breaking sea with strong winds and particularly on the ebb tide) will be passed over, E.S.E., one mile from Busby Head; from thence midchannel to abreast the Sugar Loaf from six to nine fathoms will be carried. From the Sugar Loaf to abreast Sandy Point 10, 12, and in some places 14 fathoms. From thence to Passage Islet from eight to nine, and close to the islet thirteen, when it immediately shoals towards the anchorage to seven and five fathoms over sand and mud. The tides run three knots.

CAUTION.—The banks of the channel are rather steep; and if a vessel gets into four fathoms on either side she is too close. Vessels bound to Wangarei from the southward should not steer inside a line from Bream Tail to the Sugar Loaf, or with the saddle of Manaia N.N.W. $\frac{1}{4}$ W.

DIRECTIONS.—In working up Wangarei Bay to the northward for the harbour, an isolated round hill will be immediately seen, rising out of the low land on the south side of Wangarei; this hill is one mile from the beach, and bears from the western entrance (Sandy Point) S.W. by S. $3\frac{1}{2}$ miles. To avoid the Mare Bank, as soon as this hill is brought to bear W. by S., vessels must not stand in so far as to bring the Sugar Loaf to the eastward of N.N.E.

Single Tree Point is a flat clay cliffy-looking point about 20 feet high, with a solitary tree on its extreme, which will be seen at a long distance, there being no others in the vicinity; it bears from Sandy Point W. by N. $\frac{1}{2}$ N. $2\frac{3}{4}$ miles. To the south-eastward of Single Tree is another point of the same nature, but lower (Sinclair Point) it is the commencement of the line of clay cliffs, and bears W. $\frac{3}{4}$ N. from Sandy Point nearly $1\frac{3}{4}$ miles; the channel, as far as Single Tree Point, lies on the south shore at a distance of about half a mile from it, and between it and the Snake Bank.

Snake Bank extends from the red buoy above Passage Islet anchorage in a north-west direction nearly three miles; is covered at high water, except a serpentine spit, always dry, and bearing from Passage Islet W.N.W. $1\frac{1}{2}$ miles. The following information (as well as the leading marks already given) is supplied by Captains Stephenson and Crawford for vessels proceeding up the river above the second anchorage, viz. :—After leaving Passage Island bring it on with the Saddle on Bream Head (already mentioned), steering for the outer extreme of Annoyance Point, which leads past the Snake Bank and Single Tree Point in mid-channel, between the red buoy on S.E. end of Snake Bank and the black buoy on the western edge of the channel about half-a-mile to the eastward of Single Tree Point, and when the peak to the northward a little way within Martin's Point opens clear of Beecher Point, steer more to the westward for Limestone Island, which is about eight miles above Passage Island, for some two miles, or until Single Tree Point touches Sugar Loaf Point, passing the next red buoy on the starboard hand, when steer for a flat table hill in the interior, which will be in line with a house on the beach to the N.E. of River Point, which is opposite Limestone Island, leaving the *red* buoys on the starboard, and the *black* on the port hand (four of each in all) till past the last pair of buoys, where the channel is narrow, which are about three-quarters of a mile eastward of River Point; from this the course is straight to pass the point about half-a-cable off; from the inner anchorage to River Point the soundings vary from 7 to 3 and $3\frac{1}{2}$ fathoms. Above River Point there is a long reach

to the N.N.W. of about four miles between mangroves, which are about $1\frac{1}{2}$ miles apart, the channel being midway between them about $1\frac{1}{2}$ cables wide, to some high land on the north side, whence the channel winds for some $2\frac{1}{2}$ miles to the Wharf at Wangarei, where there is 8 to 11 feet water at high water, the rise of tide being 7 to 10 feet. Limeburners' Creek—to which the railroad is in course of extension from Wangarei—is about $1\frac{1}{2}$ miles below it, and some five miles above Limestone Island. The river shoals immediately after leaving the land at River Point from four fathoms to seven and five feet at low water in Long Reach, six feet in Short Reach, and quarter of mile above Limeburners' Creek is nearly dry at low water. The channel can be distinguished by the colour of the water at the edge of the banks up to half flood, after which go by the lead. The colliers can back and fill or tow up. Small ones locally acquainted can beat. The leading marks given above up to River Point are being continually used at night time.* Mangapai River branches off to the S.W. abreast of River Point, south-eastward of Limestone Island. Steamers go seven miles up it.

WATER.—Fresh water may be obtained at either of the lower anchorages; at the first in Calliope Bay there is a small river half a mile above the anchorage, where it can be got with much facility; at the Passage Islet anchorage there is a stream running through a stony beach abreast the anchorage.

Ruakaka is a small river with a quicksand bar entrance of seven or eight feet at high water springs, about five miles from Sandy (Marsden) Point. It is only navigable for small vessels of about fifteen tons to about three miles up, and leads to a large kauri gum district.

Waipu River lies about seven miles round the bay, southward of Ruakaka. It has a shifting bar entrance, with about six to seven feet water on it at high water ordinary springs. It is navigable for small vessels for five miles as far as the north road bridge.

Mackenzie Cove lies about midway between Waipu River and Bream Tail, with anchorage sheltered from E. to N.W., S. about; for small vessels which discharge passengers and cargo here when the river is not practicable, a boat can always land under the reef, while vessels lie off and on.

McGregor Rock lies nearly midway between Bream Tail and the Sail Rock, with eleven feet on it at low water; from it the Sail Rock bears N.E. $\frac{1}{2}$ E., $2\frac{3}{4}$ miles, and Bream Island N.N.W. $\frac{1}{2}$ W. northerly.

From **Bream Tail** the coast trends S.E. $\frac{3}{4}$ E., 19 miles, to **Rodney Point**, which may be considered as the western entrance point of the Hauraki Gulf, and is bold and cliffy, with no dangers off it. Mount Hamilton, a remarkable wooded hill, 1300 feet high, with two round summits, bears inland from the point W.S.W., six miles. The soundings off this part of the coast are regular, thirty fathoms, five miles off the land, shoaling to six fathoms within half a mile.

Mangawai River lies $2\frac{1}{2}$ miles to the southward of Bream Tail. A rubble breakwater extends from its northern entrance head to the rocky islet off its mouth, which protects the entrance from north-easterly and northerly winds, has had the effect of deepening the channel some four feet, where there is now from eleven to thirteen feet at high water, and of making it much easier of access, and available for vessels of a larger class than formerly. The principal landing place is some four miles above the entrance. This is the nearest harbour on the east coast to the heads of the eastern branches of the Kaipara River. When the river is not safe with stormy easterly or south-easterly winds, landing can generally be effected in Mackenzie Cove. (See above).

Little Barrier Island (Houtourou) bears N.E. by E. $\frac{1}{2}$ E., $11\frac{1}{4}$ miles from Point Rodney, and forms the eastern entrance point to the gulf. It is a remarkable island, four miles from north to south, and three miles from east to west, steep and almost inaccessible; it rises 2,400 feet above the sea,

* NOTE.—From the above information it would appear as if the Snake Bank was placed too far to the south on the chart, and that the different banks have altered since the survey.

and has on its summit many distinct peaks of nearly the same elevation. A low and remarkable stone boulder point—steep close to—forms the S.W. extreme. The channel between it and Rodney Point is free of danger.

TAKATAU POINT bears S.E. $\frac{3}{4}$ S., six miles from Point Rodney. Within the line of these points is **Omaha Bay**, about $3\frac{1}{4}$ miles deep, in which, and one mile from Point Rodney, is Little Omaha Cove, where coasters find a stopping place in N.W. winds; there is a reef above water off its north point. The anchorage is in five fathoms, a quarter mile off the beach. In the depth or head of Omaha Bay is another small one within it, about $1\frac{1}{2}$ miles deep, and the same between its points; in its N.W. corner is Big Omaha, frequented by small coasters. There is anchorage in Omaha Bay in five to nine fathoms, with off shore winds, but exposed to easterly ones. **Takatau Point**, the south point of Omaha Bay, is long and projecting, with several conical rocks off its extreme, outside which is a shelving ledge under water, extending fully two cables off, which causes a strong tide rip; a wide berth should be given this point in passing, keeping Tiritiri light open.

Kawau Island (see Plan) lies southward of Takatau Point $1\frac{3}{4}$ miles, is $3\frac{1}{2}$ miles in extent from north to south, and about the same from east to west. Its average height varies between 500 and 600 feet; on its west side is Bon Accord harbour, with good anchorage for the largest vessels; immediately north of this harbour is the north cove, an anchorage for small vessels. To the westward of Kawau Island is Kawau Bay, extending westward for four miles, and about the same extent in a north and south direction, with a depth of from four to six fathoms in almost every part; in its north-west corner is the river Matakana, navigable for coasters.

CHANNELS.—There are three channels to Bon Accord Harbour and Kawau Bay, viz., the north, south and inner channels. The north channel lies between Takatau Point and the north shore of Kawau Island; the south channel is between the south side of that island and the Kaitu-kala Islands; the inner channel, which is convenient for vessels from Auckland or from the southward, and the easiest for navigation, is between Kaitu-kala and the mainland. North Channel, which is recommended with any but strong westerly winds, lies between the Maori and Fairchild Rocks, with a clear distance of over half a mile between them, but vessels working through must remember that spring tides run over three knots here. **MAORI ROCK**, awash at low water and one cable in extent, lies S. by W. $9\frac{1}{10}$ ths of a mile from Takatau Point; east, a little over half a mile from Maori Point (which latter lies a little over one mile to the S. Westward of Takatau Point, forming the northern entrance point into Kawau Bay), and with the northernmost Mayne Island (inside the bay, abreast Accord Point) on with Kawiti Point (the northern point of Kawau) S.W. $\frac{1}{2}$ S., the latter distant one mile. Fairchild Reef—a large flat rock awash at high water—bears from Kawiti Point E. $\frac{1}{2}$ N. nearly one mile, and N.E. $\frac{1}{2}$ N. quarter of a mile from Red Slip Island (which is about three-quarters of a mile to the eastward of Kawiti Point and adjoining the main island). To take this channel to the northward or eastward with a leading wind, pass Takatau Point about half a mile off, when, if Maori Rock is covered, steer S. by W. $1\frac{1}{4}$ miles, or until Kawiti Point bears S.W. by W. $\frac{3}{4}$ W.; Maori Rock will then bear N.W. by W. $\frac{1}{2}$ W. nearly half a mile; then steer W. by S. $1\frac{1}{4}$ miles, or until Pemble's Islet (which lies close off the north point of North Cove) is on with the west extreme of Kawau Island, which is half a mile southward of Pemble's Islet. Kawiti Point will then bear E. by S. $\frac{3}{4}$ S. half mile, and a vessel will be well clear of **SUNK KELP**, a shoal of eight feet at low water bearing west, three cables from Kawiti Point. A course may now be steered S. by W. to pass two cables outside Pemble's Islet and three cables inside the **IRIS SHOAL**, on the shoalest part of which there is 20 feet at low water with Kawiti Point N.E. by E. nearly $1\frac{1}{2}$ miles and Pemble's Islet S.E. by E. $\frac{1}{2}$ E. half a mile, with deep water between. When the entrance to Bon Accord Harbour—which is one mile southward of Pemble's Islet—opens out haul in and anchor in midchannel, abreast the second bay on the south side in $4\frac{1}{2}$ fathoms. This harbour lies about the centre of the west side of Kawau Island; it runs east and west for $1\frac{1}{4}$ miles, and is three-quarters of a mile wide at its entrance; large vessels should not go farther in than half a mile, where it is half a mile wide. Smelting Cove,

on the north side of the harbour, one mile from the entrance, has good anchorage in three fathoms off its western sandy point. Fresh water may be obtained with facility in the bay north of the outer anchorage. The passage north or inshore of Maori Rock should not be used except when the rock is visible, and by those acquainted with the channel, as sunken rocks extend some way off the points on the northern shore; there are also two patches in the fairway of this passage, bearing from Maori Rock S.W. by W. $\frac{1}{2}$ W. $3\frac{1}{2}$ and S.W. $2\frac{1}{2}$ cables respectively. If this channel is used Maori Rock should therefore be passed within $1\frac{1}{2}$ cables' length. In entering the north channel, when the Maori Rock is seen in passing Takatua Point, a course may be steered to pass outside it about three cables; and when the rock bears N.W. by N., at that distance, steer as above directed, W. by S., and observe the same marks for clearing the shoal off Kawiti Point and entering Bon Accord harbour.

Martello Rock lies S.W. $\frac{3}{4}$ W., nearly half a mile from Momona Point—the southern head of Bon Accord harbour—surrounded by a reef, extending north and south $1\frac{1}{2}$ cables, with a good passage between it and Kawan Island of more than a quarter of a mile.

Mayne Islands lie $1\frac{1}{4}$ miles westward, directly off the mouth of Bon Accord Harbour; are two small islands in a N.N.W. and S.S.E. direction, half a mile apart, with a reef lying between.

Eclipse Shoal lies between north Mayne Island and Bon Accord Point. It is nearly circular, about three-quarters of a cable in extent, with $2\frac{1}{2}$ fathoms water on it. The Middle of north Mayne Island bears W. by S. $\frac{1}{4}$ S., distant about four cables from it, and Fish Point is just shut in with south Mayne Island.

North Cove is half a mile to the northward of Bon Accord Harbour; a reef of rocks awash lies $1\frac{1}{2}$ cables north of its southern entrance point. Much sea sets into this cove with westerly winds.

The eastern part of Kawan will now be given. It is steep and bold, and may be approached within a quarter of a mile. The only danger is the Nelson Rock, with nine feet on it at low springs, and five to ten fathoms close to; it lies between the island and Flat Rock, four cables off the shore, with S.E. point of Kawan S. by W. $\frac{3}{4}$ W., Flat Rock E. $\frac{1}{4}$ S., Tiritiri lighthouse S. by E. $\frac{1}{2}$ E., and Takatua Point N.W. by N.

Flat Rock is four feet out water at high water, and can be seen four miles from a vessel's deck; is steep to and may be passed on either side. It bears from the S.E. point of Kawan E. by N. $\frac{1}{2}$ N. 2 miles, from Takatua Point S.E. $5\frac{1}{2}$ miles, from S.W. extreme of Little Barrier S. by W. $14\frac{1}{2}$ miles, and from N.W. extreme of Tiritiri N. $\frac{1}{4}$ E. 9 miles. It has a *black* beacon, surmounted with a cage and diamond, on it.

The southern side of Kawan may be passed within half a mile in 14 fathoms; two small islets lie one cable to the southward of the S.E. point of the island (Kawan Point.)

TIDES.—The flood tide runs to the westward through the north channel, sweeping round Kawan Bay, and down to the southward; on the east side of Kawan island the flood runs to the southward, and with considerable strength near the south-east extreme. The ebb runs to the northward on both sides of the island, and out to the eastward through the north channel, at the rate of $3\frac{1}{2}$ knots during springs. In the southern and inshore channels their velocity is from $1\frac{1}{2}$ to $2\frac{1}{2}$ knots.

Kaitu-kala, two small bare moderately high islands, with a clear passage (Blanche Passage) between them of $1\frac{1}{2}$ cables (which is sometimes used with a fair wind in preference to the south channel, which has the Passage Reef and Beehive Islet in it). From their N.E. end the nearest or S.W. point of Kawan bears N. by E. $\frac{3}{4}$ E. $1\frac{1}{2}$ miles. Passage Reef is half a mile in extent, and dries at low water; it bears from N.E. end of Kaitu-kala N. by E. $\frac{1}{2}$ E. over half a mile, and from the Beehive S. by E. $\frac{1}{2}$ E. $3\frac{1}{2}$ cables. The Albert Shoal is two cables in extent, with nine feet on its shoalest part at low water, and is in the way of vessels entering by the south or the western channels. It is in a direct line between the Beehive and Fish Point, bearing from the former W. by N. 9-10ths of a mile, and from the Martello Rock S. $\frac{3}{4}$ E. 9-10ths of a mile. An excellent

mark for clearing it to the westward is the Martello Rock in line with a remarkable drop in the coast to the northward, a little to the eastward of north, which leads nearly a quarter of a mile to the westward of the shoal. The passage between Passage Reef and Kaitu-kala has eight and nine fathoms in it, is half a mile wide, and is to be preferred for large vessels. After passing the S.E. point of Kawau steer for the north end of Kaitu-kala until within half a mile from it, or until the summit of Fish Point (the southern point of Kawau Bay) bears W. by N. $\frac{1}{2}$ N.; steer for it, passing about three cables to the northward of Kaitu-kala until the mark for clearing the Albert Shoal is passed, when haul up towards the Martello Rock (but on no account before); when the Beehive bears E.S.E. the Albert shoal will be passed, and vessel may proceed either side of the Martello Rock into Bon Accord Harbour as before. The Beehive is a cone-shaped islet with a white sandy beach round its base, surrounded by a reef three cables from east to west, and one cable from north to south, bearing N. $\frac{1}{4}$ E. one mile from Kaitu-kala, and S.W. $\frac{3}{4}$ W. 6-10ths of a mile from south point of Kawau. The passage between Passage Reef and the Beehive should not be taken unless the reef is seen awash, when steer to pass midway between them in four fathoms, and then west, until the mark for clearing the Albert Shoal is on, then as above. If the passage between the Beehive and Kawau be taken, keep in midchannel (with $3\frac{1}{2}$ fathoms least water), as a reef extends one cable from the point of Kawau. As soon as the Beehive is passed the water deepens to six fathoms, haul up to pass either side of Martello Rock, and as before. The projecting point (abreast Martello Rock), two cables south of Momona Point, has two peaked rocks close off it, making it a good mark from the southward.

Ora Island lies S.S.W. one mile from the south Kaitu-kala. Its south-west point bears from Wanga Point N.W. $\frac{1}{4}$ N. $5\frac{1}{2}$ miles, and from the entrance of Mahurangi Harbour E. $\frac{1}{4}$ N. $2\frac{1}{2}$ miles; it is $1\frac{1}{2}$ miles long, about 300 feet high, and lies in a north-west and south-east direction, with some rocky patches extending off its north-east and east points nearly a cable.

INNER CHANNEL.—Between Ora and the Kaitu-kala Islands and the mainland is the inshore channel to Bon Accord Harbour and Kawau Bay; for vessels coming from the southward through the Wangaparua channel it is the easiest and most convenient, particularly with a working wind, as from the south point of Ora Island to Fish Point there is a clear working channel of $1\frac{1}{2}$ miles wide, with from seven to nine fathoms. In working from the southward vessels may pass between Ora Island and the south Kaitu-kala, if convenient, there being deep water, and a channel of nearly a mile in width. In the bay immediately to the westward of Fish Point there is snug anchorage in four and five fathoms, with southerly winds. Coasters alone may pass between the Mayne Islands; there is a reef in the centre of the passage, and another nearly joining it, extending from the north end of the south island, leaving a passage between of half a cable broad, with two fathoms. There is a wider passage between the middle reef and the north island; these reefs and the deepest channels will be seen at low water.

Mahurangi Harbour (See Plan) and River.—The next harbour southward is Mahurangi, on the main land. The entrance may be known by the small saddle-shaped island Whora, which lies a little more than half a mile distant from it; this, and Ora Island, afford good protection to the harbour from easterly winds.

WHORA ISLAND lies N.W. by W. $6\frac{1}{2}$ miles from the extreme of the Wangaparua Peninsula, and W. by S. $1\frac{3}{4}$ miles from the south end of Ora Island. Vessels bound to Mahurangi should steer to the southward of both these islands, and passing the south end of Whora, within a quarter of a mile, a course should be steered direct in between the heads. A reef, dry at low water, extends nearly a quarter of a mile north from the island, with $3\frac{1}{2}$ fathoms close to its edge. The south head is wooded, and has a small conical islet (*Kiahou*) lying two cables north of it, connected by a reef; shoal water extends half a cable off this islet. The north head, Sadler Point, a steep green point without trees, should not be approached nearer than one cable, as a shallow sandy spit extends from it; the clear channel between the heads is little more than half a mile in width, with from five to eight fathoms water.

CAUTION.—Strangers entering Mahurangi Harbour are liable to mistake the arm which runs immediately north from Sadler Point for the main harbour; there is shoal water, however, in this arm a short distance within the line of the points.

DIRECTIONS.—The direct course up is N.W. $\frac{1}{2}$ W. for the peninsula of Manganui, which is high, and makes as an island; it bears N.W. $\frac{1}{4}$ W. from the north head, distant $1\frac{1}{2}$ miles; between this peninsula and the south shore is an anchorage for large vessels, with the centre of Manganui bearing N. by E. in seven fathoms muddy bottom; the channel here is scarcely half a mile wide. Westward of Manganui is another arm, running to the N.N.W., with shoal water a short distance within its entrance points.

ANCHORAGE.—There is more sheltered anchorage in five fathoms three-quarters of a mile above Manganui; immediately above this anchorage it shoals, with flats drying at low water; boats can ascend the river several miles with the tide.

There is a narrow passage into Mahurangi Harbour from the northward between the rocks north of Whora Island and the main; it is not desirable for anything but coasters.

TIDES.—It is high water F. & C. at Mahurangi at 7h. 0m., and the tides rise from seven to ten feet.

ROCK, one mile S. by E. of Kiahou islet, is a rocky patch uncovered six feet at low water, and four cables off shore, within which lies the Puhoi River, where there is a German settlement.

To the southward of Mahurangi Harbour the coast trends S. by W. five miles into the bight which lies to the westward of Wangaparoa Peninsula; it has several rocky ledges and detached reefs lying off it, and should not be approached within half a mile, at which distance six fathoms will be found; these dangers can be seen in the day time.

WAIWERA—noted for its hot springs—lies some three miles southward of Mahurangi, and may easily be known by a small islet about half a mile off the beach in the small bay, and a quarter of a mile off its point; a spit which nearly dries at low water extends to it from the beach, with rocks inside. Anchorage with offshore winds abreast the islet—which should not be opened of the land northward of it—in four to five fathoms. Sunken rocks extend nearly a cable off the S.E. point of the islet, which break heavily in easterly weather. The holding ground is good, but the anchorage is exposed to winds from about N.N.E. to south, east about. The best landing is across the spit into the river; it can be crossed at from two hours from low water by boats.

CAUTION.—Vessels may anchor in this bight, in from eight to fourteen fathoms, with westerly or southerly winds, but its head should not be approached within one mile, as the water shoals to four fathoms, and flats extend a long distance off; with strong north-east winds vessels should not get embayed here, as a heavy sea sets in.

Wangaparoa Peninsula extends from the mainland in a N.E. by E. direction for five miles, and is nearly separated in two places by deep bays running in on both sides. Its eastern face and Tiritiri island form the Wangaparoa channel. Off Wanga Point—its N.E. extreme—shelving tidal rocks extend to the N.E. $\frac{1}{3}$ of a mile, steep to; and also along shore to the westward for about $1\frac{1}{2}$ miles. A sunken rock with nine feet on it, and six fathoms close to, lies N.W. by W. $\frac{1}{4}$ W. one mile from Wanga Point, with a narrow passage of $3\frac{1}{2}$ fathoms water between it and the shore reef; the high rock off north end of Tiritiri bears E. $\frac{1}{4}$ N. $3\frac{1}{4}$ miles from it.

Wangaparoa Passage will be found safe and easy, with a clear working width of $1\frac{1}{2}$ miles, with from 9 to 15 fathoms water. There is a rock nearly awash at low water, 3 cables W. by S. from the north-west point of Tiritiri island, and some rocky ledges extend for a cable off the points of Wangaparoa peninsula; the shores therefore should not be approached too near on either side. There is also a reef awash two cables off the southern side of Tiritiri island.

ANCHORAGE.—On the southern side of Wangaparoa peninsula is good anchorage in six fathoms, with northerly winds, off a double bay—from

whose middle point a rocky ledge extends from one to two cables off shore—about a mile from the south-east extreme. Immediately westward is another bay, off whose western extreme is a small islet (Frenchman's Cap), lying a quarter of a mile from the shore.

Tofino Bay is the western bight. Here there is anchorage in five to six fathoms with northerly and westerly winds. At the head of the bay are two small rivers. The northern, the *Weiti*, has three feet water on its bar at low water, and two fathoms inside. It is navigable some miles for small coasters. The southern river, the *Okura*, is dry at low water at the entrance, with deep water above. Two and a half miles southward of the *Okura* River is *Gull Point*, a projecting headland, with a rocky patch a cable off it. Dries at low springs. About half a mile to the south-eastward of the point, and three-quarters of a mile off shore, is a ledge of rocks, which dries at half tide, extending some two cables to the south-eastward, parallel with the shore.

CAUTION.—Vessels working along the shore should be careful to avoid this ledge, observing that the dividing line of white and red lights of *Bean Rock Light* S. E. $\frac{3}{4}$ S. cuts close to it.

Tiritiri Island is one and a half miles long in a north-west and south-east direction, and bears S. by E. from the south-east end of *Kawau* $8\frac{1}{2}$ miles.

LIGHT.—The iron lighthouse, 48 feet high, painted *red*, on the south-east point of *Tiritiri* island, is 300 feet above high water. It exhibits a *fixed* white light of the second order, that in clear weather is visible 23 miles.

Shearer Rock, with only two feet on it at low water, and steep-to, lies from the east point of *Tiritiri* island E. by N. nearly one mile distant.

BUOY.—A *red* buoy marks the position of the *Shearer Rock*, but as it is moored in 14 fathoms water it is liable to be washed away. Vessels from this circumstance have struck on the rock. From the buoy the lighthouse bears W. S. W., distant about one mile; the north extreme of *Tiritiri* island W. by N. $\frac{5}{8}$ N., and its south extreme S. W. $\frac{5}{8}$ W.

DIRECTIONS.—After passing *Kawau* island, the passage to *Auckland* may either be made eastward of *Tiritiri* island or through the *Wangaparoa* passage. If the former, *Tiritiri* island should not be approached on its eastern or outer side within two miles to avoid the *Shearer Rock*. From a berth two miles eastward of the *Shearer Rock* $10\frac{1}{2}$ miles on a S. S. W. course, or from the centre of the *Wangaparoa* passage the same distance on a S. $\frac{1}{4}$ E. course, will take a vessel into the *Rangitoto* channel, which latter is $1\frac{1}{4}$ miles wide; and when in it, the mid-channel course is S. E. $2\frac{1}{2}$ miles to abreast the *North Head* of *Auckland* harbour. From *Tiritiri* island, and generally from some miles to the northward of it, *Rangitoto* and the adjacent islands eastward will be plainly seen.

Rangitoto Island cannot fail to be immediately recognised. It is circular in shape, about $3\frac{1}{2}$ miles in diameter, and rises gradually to a height of 920 feet, with a crater-like summit, composed almost entirely of masses of scoria, on which are clearly to be distinguished at a distance of seven or eight miles three nipples, and has this peculiar feature: that, taken from every point of view, it presents the same appearance. It is connected with *Motutapu*, the island next to the eastward, by a narrow sandy neck, dry at low water. *Rangitoto*, *Motutapu*, *Rakino*, and *Otatou* form a chain of islands extending some eight miles in a N. E. by N. direction from the N. W. part of *Rangitoto* to the northern extreme of *Otatou*. There is a passage of half a mile wide, with a depth of 11 to 8 fathoms, between *Motutapu* and *Rakino*, with an islet one cable off the S. W. end of the latter, and a rocky patch over one-third of a mile S. S. E. of the islet, and nearly in mid-channel. This passage is rarely used except by small vessels. The *Otatou* islands are about one mile from *Rakino*, with the islet of *Orarapa* in the channel between them. There are no dangers off the *North Otatou*; but to the south-eastward and eastward of them lie the *David Rocks* and *Ahaaha Shoal*. (See *Hieh Channel*.)

Auckland Harbour.—The *North Head* of this harbour and *Mount Victoria*—280 feet high, with the signal-station on its summit—half a mile farther westward, are two remarkable round hills, easily distinguished at a distance of two or three leagues.

DANGERS.—Several rocky ledges extend off the western shores of Rangitoto Island, which latter should not be approached in consequence within three cables. A pinnacle rock with four feet on it at low water, and $3\frac{1}{2}$ fathoms close to, lies about six cables S. Eastward of Rangitoto Reef, with the beacon on the reef N. by W. $\frac{3}{4}$ W., the N. peak of Rangitoto N. E. by E. $\frac{1}{2}$ E., and the Bean Rock lighthouse and green light S. S. E.; a *black* buoy is placed westward of it in $3\frac{1}{2}$ fathoms. Do not anchor or pass inshore of this buoy, as rocky ledges extend some distance off shore. The opposite shore on nearing Auckland should also be approached with caution, as an outlying sunken rock, with only one foot on it at low water, lies half a mile N. W. by N. from Takapuna Head, the first point of land northward of the north head of Auckland Harbour, and distant from it three-quarters of a mile. A *black* cask buoy has been placed on the north side of this rock, which is steep, with three fathoms close to. From it the flagstaff on Mount Victoria bears S. $\frac{1}{4}$ E.; buoy on Rough Rock, S. E. by E. $\frac{3}{4}$ E.; Rangitoto Peak, N. E. $\frac{1}{2}$ E.

Rough Rock, on the western side of Rangitoto Channel, with six to eight feet at low water, lies N. by E. three-quarters of a mile from the north head of Auckland Harbour, and has a buoy chequered *red* and *white* on its shoal part; it may be passed one cable's length on either side. A rocky patch, about one-third of a cable in extent, having only eight feet on it at low water springs, with $2\frac{1}{2}$ and 3 fathoms on its edges, lies between Takapuna Head and Rough Rock. A red buoy is placed on its eastern side in $2\frac{1}{2}$ fathoms at low water springs, with Takapuna Head W. S. W. $2\frac{3}{4}$ cables, Rough Rock east $3\frac{1}{4}$ cables, and the extreme of North Head S. by E. $\frac{1}{2}$ E. $6\frac{1}{2}$ cables. S. S. E. $\frac{1}{4}$ E. $2\frac{1}{2}$ cables from Rough Rock is a sand bank with 12 feet on it at low water, on the S. E. edge of which a striped *red* and *black* buoy is placed in three fathoms, with Mount Eden just open of the North Head S. S. W. $\frac{1}{4}$ W., and Takapuna Head W. by N. $\frac{1}{2}$ N. $7\frac{1}{4}$ cables.

SOUNDINGS.—The water shoals very gradually in approaching Rangitoto Channel, from 10 fathoms mud, abreast Gull Point and three miles off it, to seven and eight fathoms when nearing and abreast the reef; thence eight to six fathoms to the entrance to the harbour, between the North Head and the Bean Rocks, when it deepens to from nine to sixteen fathoms. After passing the North Head it gradually shoals to eight, seven and six fathoms in mid-channel to the anchorage abreast the Queen-street wharf for about $2\frac{1}{2}$ miles, with a width of channel of three-quarters of a mile.

CAUTION.—In passing through the Rangitoto Channel its western shore should not be approached within three or four cables, as foul ground extends two to three cables off it; neither is it prudent for large vessels to pass inside the Rough Rock buoy, or the striped one on the 12-foot sand bank.

The North Head (pilot station here—see introduction) should not be approached nearer than a quarter of a mile, as a sandy spit extends off it.

BUOY.—A *red* buoy is placed in three fathoms (to mark the spit which extends off Depot Point on the North Shore) some four cables above the North Head; a *white*—Naval—storehouse is built on this point.

CAUTION.—The south shore of the harbour is flat, and mud flats and rocky patches dry at some distance off; this shore should not be approached within a third of a mile; or in beating up, tack at the first shoal cast.

Bean Rocks, Light.—Bean Rocks which uncover at low water, bear E. by S. from north head nearly one mile distant, on which, at an elevation of 50 feet above high water, a *fixed* light is exhibited that in clear weather should be seen from a distance of about ten miles; the *red*, *white*, and *green* colours are respectively seen as follows:

Red.—Between the bearings (which are towards the light) W. $\frac{1}{2}$ S. and S. W. by W. $\frac{3}{4}$ W. in Tamaki Strait, and on south side of Koreho Channel, including the reef north of Koreho Island.

White.—Between the bearings of S. W. by W. $\frac{3}{4}$ W. and S. W. $\frac{1}{4}$ W. in the fairway of Koreho Channel, and the south-east side of High Channel.

Green.—Between the bearings S. W. $\frac{1}{4}$ W. and S. S. E. $\frac{1}{2}$ E. on the north-west of Koreho and High channels, including the east side of Rangitoto Channel and the Rangitoto Reef.

White.—Between the bearings S. S. E. $\frac{1}{2}$ E. and S. E. $\frac{3}{4}$ S. in the fairway of Rangitoto Channel.

Red.—Between the bearings S.E. $\frac{3}{4}$ S. and E. by N. $\frac{3}{4}$ N. on the west side of Rangitoto Channel, including Rough Rock and the north shore of the harbour, with the Sandspit buoy and Dépôt Point.

White.—Between the bearings E. by N. $\frac{3}{4}$ N. and N.E. $\frac{1}{2}$ E. in the fairway of the harbour.

In-shore the light is eclipsed between the bearings N.E. $\frac{1}{2}$ E. round by north to W. $\frac{1}{2}$ S.

DIRECTIONS.—Vessels entering Auckland harbour at night by the north or Rangitoto Channel should when nearing the entrance of the channel bring Tiritiri light to bear from N. $\frac{3}{4}$ E. to N. by E., and steer in keeping the light on this bearing till the white or fairway light of the Bean Rock lighthouse opens, bearing about S.E. by S., when the nearest part of Rangitoto should be from $1\frac{1}{2}$ to 2 miles distant, the Rangitoto reef about the same distance S.E. by S., and the peak about E.S.E.; then steer in on this line of white fairway light until the summit of the North Head bears S.W.; then keep away south across the *red* into the white (*harbour*) fairway light, bringing the three white lights (in a triangle) on Queen-street wharf to bear S.W. by W. $\frac{3}{4}$ W., which will lead up the harbour to the usual anchorage ground below the wharf in six and seven fathoms. These lights appear as one at three miles distance, at which distance they are not easily distinguished from the lights of the town point. Vessels having to work in should not enter on the *green* light when near Rangitoto reef—that is, when the peak of Rangitoto bears E. $\frac{1}{4}$ N.; nor on the *red* when the summit of Mount Victoria bears S.W. $\frac{1}{4}$ W., as they will on this latter bearing be in the vicinity of the Rough Rock. They must also keep well in the white light when passing the Sandspit buoy and Dépôt Point. Vessels entering by the Tamaki strait will see the *red* light over the low southern part of Koreho island, and taking care not to approach within one mile of the island, pass through the *red* into the white fairway light of Koreho channel; then steer so as to pass about two cables N.W. of the lighthouse (observing that Rangitoto peak north and the intersecting line of white and green lights S.W. $\frac{1}{4}$ W. mark the position of the nine-foot patch in this channel, the white light should therefore be kept in until the peak bears to the eastward of north), crossing the coloured lights of the Rangitoto channel, into the white harbour fairway light, and for the anchorage as before described. Vessels entering by the Hieh channel will keep on the line (S.W. $\frac{1}{4}$ W.) intersecting the *green* and white lights, edging away into the white in passing the north-west extreme of Hieh island, and thence up the Koreho channel and into the harbour as before described.

BEACON.—The beacon that formerly stood on the Bean Rocks is now erected on the north-east extreme of Bastion reef, and from it the lighthouse bears N.W., distant three cables.

ANCHORAGE.—Merchant shipping are generally berthed by the pilot opposite the wharves in from five to eight fathoms. Men-of-war should berth east of Railway Pier, which has two *red* lights (vertical) on its N.E. angle, not opening Onepolo of Stanley Point. Vessels with powder on board should anchor between a line from eastern head of Judge's Bay to Dépôt Point, and a line due north from the western point of Judge's Bay to the opposite shore. The limits of Auckland Harbour may be said to be between a line drawn from the North Head to the Bastion Rock to the eastward, and one from Stokes' Point to the Watchman to the westward, a distance of about four miles. At and above Stokes' Point the navigable channel narrows to from four to two and a half cables at and above Kauri Point, whence the Waitemata River trends to the northward and westward for a distance of some eight miles to the falls at the head of the river, a little below which is the landing-place, at Harkness' Point, where the Auckland river steamers connect with the Kaipara railway daily. The Whau—a narrow creek opposite Kauri Point, and trending to the southward—is navigable for some distance for small vessels, and has 15 feet at low water at the entrance, drying at the head, which is separated from the waters of the Manukau by a portage of $1\frac{1}{2}$ miles. Immediately above this creek is another, also branching off to the southward for some distance to Henderson's Mill.

OUTSIDE ANCHORAGE.—Should it be necessary to wait for daylight, or any other cause, to enter Auckland harbour, anchorage with southerly or westerly winds may be obtained in the bight north of Wangaparoa peninsula

in from 12 to 16 fathoms; or if advanced to the southward of that peninsula, anywhere between it and Rangitoto island, in from 8 to 10 fathoms. When sufficiently far south to be protected by the islands of Rangitoto, Motutapu, etc., safe anchorage in six and seven fathoms may be had in almost any weather. Strangers are recommended to adopt this course rather than attempt to enter the harbour at night, unless the light on Bean Rock or the Rangitoto shore and the North Head of Auckland are plainly made out.

From Auckland to the N.E.—Vessels bound to the northward or eastward from Auckland will find the Rangitoto channel the safest and easiest, as well as the most direct, and the directions already given will be found sufficient.

Koreho Channel, to the north-eastward of Auckland harbour, leads into the Hieh and Waiheki channels, and lies between Rangitoto island and the mainland. With a north-west wind, which blows directly through the Rangitoto passage, it may be sometimes convenient to pass to sea through the Hieh channel, which lies between Hieh and Motutapu islands. It is three-quarters of a mile in width, and has from 8 to 15 fathoms depth of water.

DIRECTIONS.—Leaving Auckland harbour, and passing between its north head and the Bean Rocks, when in mid-channel between the two steer N.N.E., or for the peak of Rangitoto island for about half a mile, until the flagstaff on Mount Victoria is in a line with the south end of the white sandy beach immediately to the northward of the north head of Auckland. Keeping these marks on will carry a vessel to the southward of a shoal two cables in extent, with nine feet mud on it at low water in the centre of the channel, with Rangitoto Peak north one and eight-tenths of a mile, north head of Auckland S.W. by W. $\frac{1}{4}$ W. two miles, Bean Rock lighthouse S.W. by S. one and four-tenths of a mile;—and through the channel in three fathoms at low water. When the peak of Rangitoto Island bears N.N.W., a course may be steered N.E. $\frac{1}{2}$ E. for Hieh Channel, passing the small island Koreho at the distance of little more than half a mile. On the port hand, about three cables from the Rangitoto shore, is a patch of five feet, with a *red and white* buoy on it. A reef which dries at low water extends two cables off the black sandy bay at the north-east part of Koreho Island, with a beacon near its north end, from which the east end of Koreho is on with the east part of Tamaki Head S.S.E., and the north-west end of Koreho on with Mount Eden S.W. $\frac{1}{2}$ W. Westward of the beacon the ground is clear, with $1\frac{1}{2}$ fathoms at low water.

DIRECTIONS.—In passing through the Hieh Channel, neither the north-west head of Hieh Island nor the south-east point of Motu Tapu should be approached within two cables, as there are some rocks lying off both. When Hieh Island is passed, the channel between Motutapu and Waiheki Island increases to a width of two miles, with deep water all over, and a N.E. by N. course for seven miles will take a vessel mid-channel between David and D'Urville Rocks, at a distance of $1\frac{1}{4}$ miles from either. The following is chiefly taken from the chart, viz.:—The outer or south-eastern David Rock—well out of water—lies E. by S. $1\frac{1}{2}$ miles from the south part of East Otatou Island, with foul ground extending parallel with the channel (in a N.E. by N. direction) for half a mile. Three-quarters of a mile N.N.E. of this ledge is the Ahaaha shoal, awash at high water, one-third of a mile long north and south, with its north end bearing E. by N. three miles from the north-western extreme of Otatou Islands. D'Urville Rocks lie E. $\frac{1}{4}$ N. three miles from the outer David Rock, with three feet on them at high water, and are dangerous for vessels using this channel. The north-west extreme of Hieh and Waiheki Islands in line S.W. $\frac{1}{3}$ S. just clears them to the south-eastward, and the north-west extreme of Waiheki S.W. by S. $\frac{1}{2}$ S. (or a little south-eastward of the neck of Hieh Island) clears to the north-westward of them. When clear of them haul up N.N.E., or with a north-west wind as high as a vessel will lie for Cape Colville passage.

Tamaki Strait and Waiheki Channel.—The latter channel, between the islands Waiheki and Ponoui, is convenient for vessels bound to Coromandel or the Thames from Auckland. Vessels working up for Auckland from the eastward will by using it have the advantage of smooth water and anchorage in the Tamaki Strait, which is formed by Waiheki on the

north and the mainland to the south, with excellent anchorage in every part in from four to six fathoms, muddy bottom. The only deviation from these uniform soundings is a shell bank, nearly in mid-channel, with three fathoms at low water, bearing from the north point of Clarke Island (Motu Karaka) N. E. $\frac{1}{2}$ E. $3\frac{1}{2}$ miles, and from Maraitai Point, on the mainland N. by W. $1\frac{1}{2}$ miles. A rocky ledge extends some distance off the latter point.

The TAMAKI RIVER is immediately opposite Koreho Island, and extends southwards some seven or eight miles to within a little over $\frac{1}{2}$ mile of the head waters of the Manukau. The heads are over one mile apart. A ledge of rocks, with a beacon on the outer end, extends a quarter of a mile off the western head. A bank which dries at low-water springs is in the line of the heads, a little more than one-third of the way across from the western head. It is about $3\frac{1}{2}$ cables long, nearly parallel with the shore, and about one cable wide. The entrance of the channel is between this bank and the beacon off the western head, a quarter of a mile in width, with the beacon on a point on the eastern bank, some $1\frac{1}{2}$ miles from the head, on with McLean's house (conspicuous inland) S. E. $\frac{1}{2}$ E., passing about half a cable outside the outer beacon on the ledge off the west head, in from 15 to 18 feet water. About five-eighths of a mile from the outer beacon, and abreast the inner end of the bank above mentioned, a shoal belt nearly two cables across with six and seven feet on it at low water, has to be crossed, after which the water deepens up to 27 and 30 feet, abreast the inner beacon point, which is bold-to. Buckland's wharf and landing-place for cattle is in the bay, a third of a mile below Beacon Point. Off it is the usual anchorage, with 24 feet at low water. Vessels lying here any time should moor, as the tide runs strongly, and the channel is narrow. Above Beacon Point—which should be kept on board to avoid the spit which stretches out from the opposite projecting point—the river turns to the westward. At Panmure, some three miles further up, there is from 12 to 15 feet at low water. A substantial bridge crosses the river here, opening near the eastern side for vessels to pass through. Another bridge crosses the river at Otahuhu, near its head. The Tamaki River is much used by the local steamers and small coasters.

The WAIROA RIVER is in the south-eastern extreme of the Tamaki Strait. The entrance is in the depth of the deep bay between the Wakakaiwharu and Koherunui Points, with shallow water in it. The mouth of the river is about 160 yards wide, where it nearly dries at low water, deepening within to six and four feet, with a channel 120 yards wide. There is steam communication with Auckland. The district is noted for its dairy produce.

After having cleared the nine-feet shoal in Koreho passage as before directed, and passed the island of Koreho on its north side at half a mile distance, keep to the southward of Hieh Island, and when about the same distance from it steer E. $\frac{1}{4}$ N. for the Passage Rock, which will then be nine miles distant.

Passage and Sunday Rocks.—The former is 40 feet high, and may be passed close on either side. In a direct line between it and the northern or outer extreme of Ponoui Head, nearly $1\frac{1}{2}$ miles from each, and about $3\frac{1}{2}$ cables off the nearest part of Waiheki, lies the Sunday Rock, with eight feet at low water. It bears from the south point of Waiheki E. by N. $\frac{3}{4}$ N. nine-tenths of a mile, and from Thames Point (west point of Ponoui) N. by W. $\frac{1}{4}$ West three-quarters of a mile, with nine and ten fathoms in the channel on either side of it.

DIRECTIONS.—If Passage Rock is passed on the north side, the Waiheki shore should be kept on board within two cables for $1\frac{1}{2}$ miles after passing it (keeping Ponoui Head on the starboard bow), until the bay south of Finger Point is opened out. A vessel will then be well clear of Sunday Rock. If Passage Rock is passed on the south side, a course should be steered for the point next south of Ponoui Head for $1\frac{1}{2}$ miles, or until Thames Point bears S. by W. $\frac{1}{2}$ W. The channel then becomes three-quarters of a mile wide, with from 6 to 12 fathoms water in it. Ponoui Head should not be approached within a cable, as some rocks lie off it. Northward of Ponoui Island, and in a line between it and the eastern extreme of Waiheki, are the small islands of Rotaro and Pakatoa, with narrow channels between them, only used by coasters. A cluster of rocks awash, one cable in extent, lie W. $\frac{3}{4}$ S. half a mile from the round south head of Rotaro. Single Rock

lies S.W. by W. half a mile from the south-west point of Pakatoa, above water, with deep water close-to. Mid-way between it and the point is a sunken rock; but vessels have no occasion to pass eastward of Single Rock, between which and Waiheki is the channel, three-quarters of a mile wide. A reef extends nearly two cables northward of the north point or Pakatoa. Between it and the nearest point of Waiheki is the Waiheki Channel, half a mile wide, with from 22 to 15 fathoms in it.

WATER.—Opopo Bay, at the east end of Waiheki Island, is a favourite watering place. A vessel may anchor as near as convenient to the stream.

Terakihi Islet.—In passing out of the Waiheki Channel, this bare rocky islet will be seen, $1\frac{1}{2}$ miles eastward from Pakatoa. There are no dangers near. It is generally covered with cormorants. When clear of the Waiheki Channel, and abreast Terakihi, a N. $\frac{3}{4}$ W. course 23 miles will take a vessel to the westward of Channel Islet (Takaupo) and into the channel between Cape Colville and the Great Barrier Island.

The Sandspit Passage lies between the southern part of Ponoui Island and the extreme of a long shingly spit, extending from high-water mark at the north-east extreme of Pahiki Island for six cables to the tail end, which has six feet water on it at low water, where the lighthouse is erected. The light is elevated fifty feet above the sea level, and is visible 12 miles. It is *fixed* white and red. It changes from white to red on or about a W.N.W. and E.S.E. bearing, being the night mark for clearing the shoal off Oreri Point.* Vessels intending to pass through this passage from the Tamaki Strait should, when abreast Passage Rock and about one mile from it, bring the lighthouse to bear E. by S. $\frac{3}{4}$ S., and steer for it until the points on the north-western side of Pahiki island are in line. They will then be almost abreast the rocky south-west point of Ponoui Island, which should be passed a full cable's length off, to avoid the rocks which lie off it. From this position steer so as to pass about half a cable northward of the Lighthouse, by which the elbow of the spit, which extends about W. by N. three cables from the Lighthouse, will be avoided. From the position above given, abreast Passage Rock, the deepest part of the channel is only from one to two cables wide, with an irregular depth of from $3\frac{1}{2}$ to 5 fathoms, shoaling gradually towards the south shore, and with a uniform depth of about $2\frac{1}{2}$ fathoms towards Ponoui. When abreast the Lighthouse alter course immediately to the south-eastward, to clear the rocks of the Ponoui shore, keeping the same distance off the Lighthouse; thence—if bound to the Thames—so as to pass about two miles north of Oreri Point, off which lies a patch of rocks half a mile from the shore, and dry at low water, and with shoal water outside them for half a mile, on which there is a break with a northerly swell. The hummock of Karamuramu Islet (south of Pahiki) kept open of Raukura Point W. $\frac{1}{2}$ S. clears this danger to the northward. At night time keep in the *white* light. From the position off Oreri Point the course to the Thames is S.E. by E. $\frac{1}{2}$ E. about fifteen miles.

TIDES.—On the eastern coast of the North Island the flood stream runs to the northward, and the ebb to the southward, at the rate of about one knot; but in the Hauraki Gulf they take a contrary direction, the flood running south and the ebb north. The body of the flood stream, entering from the southward between Cape Barrier and Cape Colville, separates about False Head, on the west side of the Great Barrier Island, and sweeps round to the southward, filling the Thames and Waitemata Rivers through the different channels leading to Auckland. The ebb tide in mid-channel runs from 1 to $1\frac{1}{2}$ knots to the south-east between Great Barrier Island and Cape Colville, but in shore much stronger. The range of tide in the Hauraki Gulf is from four to ten feet. In the Wangaparoa Channel the tides run from one to two knots; in Waiheki Strait, half a knot; but from two to three knots in the adjoining narrow channels.

* NOTE.—This light has never been gazetted, but its arrangement is supposed to be as follows:—*Red* from outside Orere Shoal to Raukura Point, thence *dark* to Whakakaiwaru Point, and the rest of the circle *white*.

FRITH OF THAMES.

Cape Colville, the eastern limit of the Hauraki Gulf, is the northern extremity of a peninsula more than 40 miles in length, the western shores of which are bold and clifty, and form the eastern boundary of the Frith of Thames. Throughout the whole length of this peninsula runs a chain of high and wooded mountains (2,000 feet), rising abruptly from the sea on either shore, and over the cape in two distinct peaks, 2,800 feet high.

SOUNDINGS.—The entrance of the Frith of Thames is 16 miles in breadth from Cape Colville to Waiheki Island, with uniform soundings of 22 to 26 fathoms mud, gradually decreasing to the bar of the River Thames. From Cape Colville the coast trends south-easterly for ten miles to Cabbage Bay. A small bay opens to the westward with three fathoms in it, visited by coasters for timber. There are sawmills here. S.W. by W. $3\frac{1}{2}$ miles of the south point of the bay is a small islet, the northernmost of a chain of islands extending along the coast to the south-east for four miles. There are several rocks lying awash among them. Strangers should not pass between them. Half a mile south of the southernmost island is a rock awash. There is, however, a channel between them and the mainland, one mile wide in its narrowest part, through which a vessel can run in safety, carrying 9 and 10 fathoms. Areeka Point—which has a ledge of rocks, extending a short distance off it—lies S. by E. $\frac{1}{4}$ E. five miles from Cabbage Bay. It forms the north point of a deep bight, at the head of which is Kikowhakariri Bay, visited by coasters for the logs which are floated down its creek. The southern side of this bight is formed by the Waihou Peninsula. Off it lie the islands of Huieh, Waimata, and Hoki, extending about $3\frac{1}{2}$ miles in a N.W. by N. and S.E. by S. direction. Huieh, the north-west one, lies nearly $1\frac{3}{4}$ miles W.S.W. of Areeka Point, is half a mile in extent, high and clifty on its north and west sides, terminating in a low shingle point to the eastward, quarter of a mile north-eastward of which is a small islet. There is also a rock above water a quarter of a mile off its south side, and another islet about four cables to the south-west of its south-west point. Waimata, the middle island, is a double island, one mile long north and south. The northern part is called Kopui. Three cables N.W. by W. from the north-west clifty point of Waimata is a reef, covered at high water; and half a cable off its southern end is a sunken rock. There is a passage three cables wide, with 9 and 10 fathoms between it and Huieh. Hoki, the southernmost and smallest island, is half a mile long, with a passage of same width and 14 fathoms water between it and Waimata, and one between it and Waihou Peninsula about three cables wide with six fathoms of water.

Coromandel Harbour lies immediately to the southward of these islets, 20 miles S.S.E. of Cape Colville, and 14 miles E.N.E. of Waiheki Channel, and runs in a north-east and south-west direction between the Waihou Peninsula and the mainland. Is one mile wide at the entrance which may easily be known by the small round islet Tuhia, which bears from the north entrance point—Tawhiti—W.S.W. $1\frac{1}{2}$ miles, and a smaller rock a quarter of a mile south of Tuhia. Its position is also well marked from a distance by Castle Hill, which has a square rocky crest 1,600 feet high, lying three miles to the eastward of the head of the harbour. Tuhia may be passed on either side, then steer to pass close round the south-east point of Waihou Peninsula, and anchor about three cables off shore in four fathoms, taking care not to open out the sandy neck which joins Waihou to the upper part of the peninsula. A quarter of a mile above this anchorage the water shoals to 14 feet. There is also a shoal patch of four feet at low water three cables above the anchorage, which bears from south-east point of Waihou north-east three-quarters of a mile, and the same distance S.E. by E. from the sandy neck. There is a wharf at Keven's Point, at the north-east head of the bay, with 9 to 10 feet at it at high water ordinary springs.

Tekomi Harbour lies immediately south of Coromandel harbour, is three cables wide at its entrance, well sheltered by the island of Rangipuka (three-quarters of a mile long in a north-west and south-east direction), lying close off its entrance. Half a mile inside the heads of this harbour a vessel may anchor in four fathoms. There are three fathoms three quarters of a mile inside, but above that shoal water. Rangipuka may be passed on

either side. The north side is the best, as a reef extends nearly two cables southward from its south point. (See plan of Coromandel Harbour.)

MENIA BAY is one mile south of Tekomi. It is open to westerly winds. There is anchorage in $3\frac{1}{2}$ fathoms three-quarters of a mile inside the Wekarua Islands, which lie half-a-mile westward of the north head. Off Deadman Point—the southern entrance point of Menia Bay—several rocks above water extend a quarter of a mile off shore.

One mile southward is the small open bay of KIRITA. Some $2\frac{1}{4}$ miles W.S.W. of the southern point of this bay a rock is known to exist by the Maoris (who use it as a fishing ground), with $2\frac{1}{2}$ fathoms on it at low water. From it a burnt patch is in line with the conical hill Wakatarata on about the same bearing.

The middle bank, with three fathoms on it at low water, is some $2\frac{1}{2}$ miles S.W. by S. from this sunken rock, and lies in the middle of the Frith, with Deadman Point N.E. by N. 5 miles, and the north-eastern extreme of Ponoui Island N.W. by W. $\frac{1}{2}$ W. seven miles.

From DEADMAN POINT the coast line trends to the south-eastward for sixteen miles to Tararu Point. Waikowhau and Tapu Creeks lie nearly midway between, and are visited by small coasters. At the latter gold mining is carried on. The shore may be approached to half a mile as far as Tapu, after which the shoal water gradually extends off, curving round to the western shore; the three-fathom line being as much as six and seven miles from Opani Point, at the entrance to the Thames River, which is some 12 miles from Tapu, and $3\frac{1}{2}$ miles from Tararu Point. Large vessels anchoring outside the river would find four fathoms some four miles off the eastern shore and seven miles from Opani Point, from which it will be seen that a close attention to the lead is necessary. A little over one mile within this the three-fathom line crosses the bay. A remarkable saddle in the ranges to the north-eastward will be seen on passing Tapu, which as long as it is open indicates comparatively deep water; when it closes in, a vessel will be close to the three-fathom line.

From TARARU the shore line runs S.E. $2\frac{1}{4}$ miles to Shortland wharf, on the point at the entrance to Kaueranga Creek, along which extends the goldfield towns of Grahamstown and Shortland. The principal or goods wharf is at Grahamstown, extending out some 1,800 feet, but dries outside the end for several hundred feet at low-water springs; at high-water springs there is 9 to 11 feet alongside it. On the end of the wharf are shown three lights in a triangle—upper *red*, two lower *white*—which can be seen seven miles off in clear weather. The passenger wharf is a short distance above the goods wharf. A green light is shown on it, visible only a short distance. The bank appears to be extending seawards. Coasters usually lie on it: soft mud. About three-quarters of a mile off Tararu Point there is from 10 to 12 feet at low water, with the flagstaff on Tararu Hill north-east. Timber is brought to the wharf from the Shortland Sawmills, up the Kaueranga Creek. Vessels drawing five to six feet can load at Shortland Wharf inside the creek in smooth water.

The western entrance-point to the THAMES RIVER (Opani Point) lies nearly south $1\frac{1}{2}$ miles from Shortland Point. The eastern shore is nearly a continuation of the line from Tararu to the creek, on to Kopu, the lower anchoring-ground within the river, where its banks are about four cables apart; at Opani, at the entrance, they are nine cables apart. The approach to the Thames River may be known by a dense white-pine forest, one mile from the mouth, on its western bank. It is a bar river, with 4ft. on the bar at low water; high water at full and change, 7h. 5m., but greatly influenced by direction of wind. It is not considered fit for vessels drawing over 14 feet water to enter. Vessels bound for the river should keep about three miles off the eastern shore, and when Tararu Point bears N.E. by E. they will be close to the fairway buoy—which is *black and white*—in 4ft. 6in. at low water, and nearly $4\frac{1}{4}$ miles N.W. by W. $\frac{3}{4}$ W. from Opani Point; or, if the buoy be away, when near the first bearing bring the willows at Kopu (above mentioned), just open to the eastward of Opani Point, and steer in over the bar E.S.E. till you get well up to the first beacon on the eastern side, passing two *black* buoys—on the edge of the Swatchway, and nearly three-quarters of a mile to the westward of a pipi bank, nearly awash at high water, which stretches across the bank eastward towards the mangroves on the eastern

shore—on the port hand; thence to the lower anchorage at Kohu, which is considerably sheltered from the sea by the pipi bank above mentioned. It has been suggested to have a wharf frontage along the bank of the river here, where for nearly a mile vessels drawing up to 14 feet could lie afloat at low water. There is a small wharf there now. Gibbons' Sawmills are half a mile above Kopu. About one and a half miles above the willows at Kopu are the Telegraph towers, one on either side of the river, 90 feet high. The wire is lowered into the river on notice being given by vessels wanting to pass. About $1\frac{1}{2}$ miles above the Telegraph towers, at Orere, on the west bank, are other sawmills. This is considered the second or river anchorage, where vessels drawing up to 14 feet could lie in from 9 to 14 feet at low water. Above this the river narrows and becomes winding. Local knowledge or a pilot is necessary to proceed above Kopu. A good description of the snagging operations carried on by Mr. Firth higher up the river will be found in "Brett's New Zealand Almanac" for 1880; his steamer goes 70 or 80 miles up the river. It is high water at Orere some 17 minutes after Tararu, or at about 7h. 30m. Strong northerly winds send the water in, strong southerly the contrary, making them both in height and time uncertain. At three-quarter ebb the tides in the river run three to four knots.

Piako River is nearly five miles westward of the Thames, runs nearly parallel with it, is much smaller, and only navigable for boats at low water.

Pukorokoro River lies in the south-west head of the Frith, and has seven to nine feet at high water in the channel. There are coal mines in the vicinity.

THE GREAT BARRIER ISLAND—COAST FROM CAPE COLVILLE TO EAST CAPE, INCLUDING THE ISLANDS AND ROCKS IN THE BAY OF PLENTY.—EAST CAPE TO MAHIA, OR TERAKAKO PENINSULA.—MAHIA PENINSULA TO CAPE PALUISER. (SEE ADMIRALTY CHARTS NOS. 2,543, 2,527, 2,528, AND SHEETS 2, 3, AND 4.)

VARIATION IN 1875.

East Cape - $14^{\circ} 15'$ E. | Cape Turnagain - $15^{\circ} 0'$ E.

GREAT BARRIER ISLAND.

The Great Barrier Island (Otea) on the eastern side of the Hauraki Gulf, affords great protection to it from seaward. It is 21 miles long N.N.W. and S.S.E., and 10 miles across in its widest part, which is about the centre. A range of mountains extends through its whole length. Mount Hobson, the highest, rises to a peak from the central part of the island to a height of 2,130 feet. The island is in parts thickly wooded. Small vessels are occasionally built here.

West Coast, Great Barrier Island.—On the western side are several bays and harbours, for the most part open to westerly and south-west winds, but affording excellent shelter from easterly. They are, commencing from the northward, Catherine Bay, Ports Abercrombie and Fitzroy, Wangaparapara Harbour, Okupu Bay, and Port Tofino (see chart). The northern extreme of the island is a high peninsula, one mile in length; several high pinnacle rocks stand off the extreme, whence named Aiguilles, or Needles Point. From Needles Point, the western coast trends S.W. by S. $5\frac{1}{2}$ miles to Miners Head, the north point of Catherine Bay; the summit over this head is a conical hill, resembling a beehive; there is a small cove immediately south of Miners Head, where coasters may anchor in fine weather: a rock awash at high water lies in the centre of it.

Catherine Bay.—The south head, Separation Point, is nearly three miles S. by W. from Miners Head, with a remarkable pillar rock off it; there are 25 fathoms water across the entrance, it runs to the eastward for $2\frac{1}{2}$ miles, narrows very rapidly, and terminates in two sandy coves, separated by a narrow peninsula. On the north side of the bay, a quarter of a mile from the shore, and nearly one mile north-west of the peninsula, with a passage of five fathoms between it and the shore, is a large flat rock (Bird Rock), always awash; there are 12 fathoms between this rock and the south

shore, and good anchorage half a mile to the south-east of it, with all winds from north round by east, to south-west, in six and seven fathoms, sand and shells. Coasters may get shelter from westerly winds in a cove on the south shore, three-quarters of a mile S.S.E. of the rock, in five fathoms sandy bottom, midway between the west point of the cove and the peninsula extreme; but if the wind should come from the north-west a vessel should immediately work over to the north side of the bay, and anchor under the Bird Rock, between it and the main in five fathoms. The coves at the head of the bay are shallow a short distance within the peninsula extreme.

Port Abercrombie is $1\frac{1}{2}$ miles south of Catherine Bay; its entrance is $1\frac{1}{4}$ miles broad, with 30 fathoms water across; it is entirely open to westerly winds, and the general depth—14 to 20 fathoms—is too great for convenient anchorage, except in Nagle Cove, a small but secure anchorage immediately round the north head, where several coasters might lie in safety, and with room for two sloops of war when moored; Oyster Islet lies in its centre; the depth of water is from nine to seven fathoms; fresh water and fuel may be obtained. Selwyn Island, which from seaward appears as part of the main island, is two miles in length east and west, and lies on the south shore of Port Abercrombie. Immediately westward of it are two islets about one cable apart, bold and steep; the remarkable outer bluff of the westernmost one—Wellington Head—forms the south entrance point of the bay, and is some $1\frac{1}{2}$ miles from the N.W. extreme of Selwyn Island, N.E. by E. $\frac{1}{2}$ a mile from this head (with a small islet between them) is a reef which must be passed to the northward.

Port Fitzroy, the inner harbour of Port Abercrombie, is an extensive sheet of water, well sheltered from all winds. Its entrance, between the northern part of Selwyn Island and the main island, is two cables in width, with a depth of more than 20 fathoms in it, and bears E.S.E. $1\frac{1}{2}$ miles from the north entrance point of Port Abercrombie. As it is bounded by high land on either side, flaws and violent squalls of wind will generally be met with in it. A quarter of a mile within, the harbour opens out to a general width of nearly half a mile, and extends for nearly three miles to the southward, with two bays to the eastward about a mile in depth. One and a half miles within the entrance the depth of water is from 17 to 14 fathoms, mud, when the narrow channel south of Selwyn Island (Governor's Passage) opens out, the harbour expands to a width of nearly a mile, and with this passage again shut in there is good anchorage, borrowing on the western shore, in six and seven fathoms, mud bottom. There is a rock above water E. $\frac{1}{2}$ S. half a mile from the south end of Selwyn Island, with Governor's Passage just open. This passage is only fit for boats, and has a rock under water (the Paget Rock) in its outer entrance.*

False or Bald Head bears S. by E. $\frac{1}{4}$ E. $3\frac{1}{4}$ miles from Wellington Head, which it much resembles. It is also the westernmost of a group of islands which lie off the main island, leaving a passage between, with $3\frac{1}{2}$ fathoms least water in it, a quarter of a mile wide in the narrowest part. Within the line of these two remarkable heads are several small islands. A vessel may work freely among them, as there are no dangers but what may be seen. Thirty fathoms will be found two miles off shore, and ten fathoms within half a mile of this part of the coast.

Pig Islands.—Good anchorage for small vessels may be obtained in the passage between these islands and the main, in four fathoms, off the pebble beach on the centre island, nearly out of the tide, and sheltered from all winds but north-west, which would cause a swell to set in. Two rocks awash lie half a cable off the south-eastern point of the centre island. A chain of three steep rocky islets, almost connected, and between which the sea is always breaking, lie parallel with and to the eastward of the southernmost Pig Island. They extend off the point of the main island

* Governor's Passage, though only 252 feet across at the narrowest part, is practicable and safe for steam vessels, as the sides are steep-to, like the entrance to a dock, and the narrows short in extent. The rock under water is not in the centre of the outer entrance, but is the Paget Rock of the charts, where the danger in question is in its right position. It is, however, a dangerous patch, as it never uncovers, and there is no break to mark its position.—Captain Hope's "Remark Book," H.M.S. *Brisk*, 1865.

southward for half a mile. A fourth, of the same character, projects westward at right angles to the southern one. There is deep water between the Pig Islands and this chain. The width at the southern entrance is three cables. A rock which breaks lies a cable south-east of the fourth islet, and another, which also breaks, a quarter of a mile to the eastward of the three. To the eastward of the rocky islets the coast recedes, forming a bay, but there is no shelter or anchorage in it. The south side of the southernmost Pig Island is a steep perpendicular cliff, with a conical islet, equally inaccessible, lying immediately off it. Passing outside this island, 25 fathoms will be found close-to, and Cliff Island, a high, steep, wedge-shaped islet, with a sharp peak on its south end, will be seen bearing E. $\frac{1}{2}$ S. four miles distant. Cliff island is more than a quarter of a mile from the shore with a smaller islet within; it may be passed close on its outer side in 21 fathoms.

The **Horn Rock**, which breaks with any swell, lies nearly in mid-channel between Great and Little Barriers, bearing E.S.E. four miles from the south-east end of the latter, south-west five miles from False Head of Great Barrier, and W. $\frac{1}{2}$ S. seven miles from the Pirogues Rocks. There are 12 and 13 fathoms close-to, 25 to 30 fathoms in the passages on either side.

Wangaparapara Harbour lies a little more than a mile to the eastward of Cliff Island, running in a N.N.W. direction one mile, with a width of three cables. This is a snug little anchorage with all winds, except those between S.S.E. and south-west. In a cove immediately inside the western entrance point is the best anchorage, in 4 $\frac{1}{2}$ fathoms.

Pirogues, three bare flat-topped rocks, high above water, resembling boats under sail, a cable in extent, lie off this part of the coast, and may be seen for several miles. They lie from the western head of south Pig Island S.E. $\frac{1}{2}$ E. three miles, and from Cliff Islet south-west 2 $\frac{1}{2}$ miles. There is deep water close to, and 22 fathoms between them and the shore.

Okupu Bay, one mile south-eastward of Wangaparapara Harbour, is one mile wide at the entrance, and runs to the north-east 1 $\frac{1}{2}$ miles, with from nine to seven fathoms in it, and three fathoms within a quarter of a mile of its head, which terminate in two sandy coves. A considerable stream empties itself into the southern one. It is entirely open to winds from south to west, and not recommended as an anchorage.

Port Tofino is the southern harbour, and lies S.S.E. 2 $\frac{1}{2}$ miles from Okupu Bay. The coast line between is straight and bold, with 15 fathoms a quarter of a mile off. A small islet lies a quarter of a mile from the shore, half a mile before reaching the north head of the port, which is a remarkable conical peak, with a high-peaked islet close off it. The heads lie W.N.W. and E.S.E. two miles from each other. At the inner north head—a high clifly peninsula—the entrance contracts to 1 $\frac{1}{2}$ miles in width, the harbour running for the same distance in a N.E. by N. direction. Three-quarters of a mile inside the peninsula a flat rock (Bird Rock) lies a quarter of a mile off the north shore, nearly connected with it by a reef.

ANCHORAGE.—Between Bird Rock and the head of the harbour there is good anchorage off the northern shore in six and seven fathoms, with all northerly and westerly winds. From easterly or south-east gales, a cove in the south-east corner of the bay immediately westward of a high rocky peninsula point on the south side of the harbour affords excellent shelter in four and five fathoms, mud. Small vessels might anchor far enough in to be sheltered from south-west winds.

SOUNDINGS.—Inside a line between the peninsula point on the south shore and the Flat Rock on the north, the depths are from 9 to 10 fathoms, and outside it from 12 to 18 across the entrance.

CAUTION.—Port Tofino is a favourite anchorage with the coasters. The ebb tide, however, which runs to the south-east along this side of the Great Barrier Island, sets strongly out of the harbour, and a vessel working in from the southward, unless with a fresh breeze, is liable to be drifted out—the water being too deep to anchor—and swept through the passage between Capes Barrier and Colville.

ROCK.—Half a mile south of the southern head of Port Tofino is a rock which does not always break, and between it and the shore another sunken one. There are 20 fathoms a very short distance outside these rocks.

Cape Barrier, the south-east extreme of the island, is $2\frac{1}{2}$ miles E. by S. from the south point of Tofino harbour, and midway between projects what appears a peaked island, but is connected with the main by a low neck. Rocks extend a cable off Cape Barrier; and two, detached and breaking, lie three cables to the eastward of it. There are 28 fathoms, sand, one mile off the Cape; within that the bottom is rocky. Vessels rounding this cape are recommended to give it a berth of two miles.

East Coast, Great Barrier Island, is destitute of harbours, and, unless after westerly winds, there is generally a heavy swell setting on it. From Cape Barrier the coast trends north two miles (a small high steep islet lies close off the shore one mile from the Cape), then to the north-west five miles, where there is a sandy bight but no anchorage. From this bight the land trends to the northward four miles to the easternmost projection, a bluff rounding cape.

Arid Island.—Two miles northward from this eastern cape is Arid Island, bold and clifty, with landing on its western side in fine weather. It is $1\frac{1}{2}$ miles long north and south, and three-quarters of a mile broad. Off its eastern side, and extending to the East Cape, are four small conical islets, all steep-to. The coast from the East Cape recedes to the westward four miles to a sandy bay which extends in a north and south direction two miles, with a track of $2\frac{1}{2}$ miles across the island to Catherine Bay. There are 14 fathoms, sand, in the bay one mile from the beach, and 13 fathoms rocky bottom between Arid Island and the East Cape. A vessel might anchor in this bay with westerly winds if necessary. Off its northern points are two small islets; the coast then trends N.W. by N. five miles to Aiguilles or Needles Point.

SOUNDINGS.—Three miles eastward of the East Cape there are forty-five fathoms, mud; to the southward the same depth, fine dark sand. One mile outside Arid Island there are 29 fathoms, sand. The flood tide, entering Cape Colville Passage, sweeps to the north-west along the western side of the Great Barrier Island as far as False Head. It is there met by the flood stream, which enters the Hauraki Gulf from the northward, causing during the springs confused rippings both off False and Wellington Heads. There is very little tide felt on the outside of Great Barrier Island. The flood tide runs to the northward.

COAST FROM CAPE COLVILLE TO MERCURY BAY.

Cape Colville.—The pitch of the Cape is the north-eastern point of a sand bay, nearly one mile in extent, which lies in the north-west angle of the peninsula, with a reef of rocks extending nearly three-quarters of a mile to the northward. The tide races are strong off Cape Colville, and vessels are recommended to give it a berth of $1\frac{1}{2}$ miles should they pass between it and Channel Islet (Takoupo), which bears from the Cape N.N.W. $\frac{1}{4}$ W. $2\frac{3}{4}$ miles; but, unless with a commanding breeze, it is recommended to pass northward of Channel Islet. Cape Barrier bears from Cape Colville N.N.E. $12\frac{1}{2}$ miles. Between these capes is the eastern approach to the Hauraki Gulf.

Cuvier Island bears from Cape Colville E.N.E. 20 miles. It is two miles long east and west, and rises to a rather remarkable peak. It is visible from a considerable distance, and serves as a finger-post to the channel. From Cape Colville the land trends E. by N. $\frac{1}{2}$ N. three miles to a similar rocky headland, W.N.W. from which three-quarters of a mile is a rocky islet similar to Channel Islet. The coast then runs to the south-eastward nearly four miles to Charles Cove, a small bay running to the south-east, but exposed. Coasters cannot enter far enough for shelter, on account of its shoal water, but frequent it for the timber cut at the Auckland Company's mill. Half a mile to the north-west of the eastern head of Charles Cove is a small islet, and the coast continues its south-easterly trend four miles to a cliffy point. Three miles S.S.E. of this cliffy point is Waikawau Bay and River, both unimportant and unsheltered; three rocks above water lie half a mile off the coast, a mile south-eastward of the bay.

Kennedy Bay (*Aratuhu*) is distant four miles from Waikawau; its entrance, which is half a mile wide, bears from the north-west end of great Mercury Island S.W. $\frac{1}{4}$ W. 9 miles; it affords fair anchorage for small

vessels in four and five fathoms, with westerly winds round from north to south. There is a saw mill here, and it is visited by small coasters for timber.

ROCK.—N.E. $\frac{1}{2}$ N. from the outer south-east clifly point of this bay, three-quarters of a mile, is a rock awash; there are six and seven fathoms between it and the shore.

South-eastward of Kennedy Bay are two sandy beaches, each about a mile in extent; round the clifly south head of the southern beach is Wangapoa River, fit for coasters, having five feet water on its bar at low water; this river has been used by vessels of 250 or 300 tons, but the entrance is narrow, and the tides strong; a commanding breeze is wanted, and a local pilot should be obtained; Harris' saw mills are here, and there is a large export of timber. The south point of this river is sandy, and a sandy beach extends for two miles to the eastward of it.

From Wangapoa River the coast trends E.N.E. eight miles to Tepaki Point, which is nearly four miles to the north-westward of the north entrance point of Mercury Bay; off this point lie the Mercury Islands.

Mercury Islands (or D'Haussez Group) occupy a space of nearly ten miles in a north-westerly and south-easterly direction, and about the same east and west; there are four principal and several smaller islands, also low reefs and rocks interspersed among them. Great Mercury (Ahou Ahou), the largest, is four miles long in a N.W. and S.E. direction, and three miles broad at its southern part; it is steep and clifly on the north and eastern sides, with the highest summit towards the S.E. end. Its southern face is three miles from Tepaki Point. On its west side is a deep bay with anchorage at its N.E. end in five fathoms in fine weather.

There is a sunken rock* with four feet on it at low water in the fairway of the entrance to the cove, which is in the N.W. angle of the bay, where small coasters lie, from which the S.W. point of the island bears S. by E. $\frac{1}{4}$ E., and two rocks out of water which lie off the north-western part of the bay nearly in line, bearing W.S.W.

A rock twenty feet high lies N.E. by N., half-a-mile from the N.E. point of the island.

Red Mercury (*Wakahu*), three miles round, is the outer or easternmost of the group; it lies four miles to the eastward of the S.E. part of the Great Mercury.

N. by W. $\frac{1}{4}$ W., $1\frac{1}{2}$ miles from its north clifly point, and E. by N., seven miles from the N.E. end of the Great Mercury, lies **Richards Rock**, a dangerous rock which uncovers only at low springs, with deep water round it; it breaks occasionally.

Between the Great and Red Mercurys are the islands of **Kawhituhu** and **Kora-puki**, with several smaller islets and low reefs. The passages between all these islands should be avoided. Nearly one mile south of Kora-puki are two rocks awash.

Ohena, the southernmost island, lies E. by N. $2\frac{1}{2}$ miles from the north entrance point of Mercury Bay. Two low reefs bearing from N. by E. to N.E. extend from 1 to $2\frac{1}{2}$ miles off its north extreme; and north-west of it are two small low islands, twenty feet high, one and a-half miles distant respectively.

Koruenga Islets.—Half a mile from the north entrance point of Mercury Bay are the steep gray islets, named Koruenga, 150 feet high, the outer islet being known as the Needle.

Mercury Bay (see Plan).—This large inlet, 30 miles south-east of Cape Colville, is five miles wide at its entrance, and affords anchorage during westerly winds in sandy bays on its north and south shores. Cook's Bay, on the south side, at the mouth of the Oyster River, is the preferable anchorage. At the head of Mercury Bay, in the south-west angle, is Mangrove River, a snug anchorage, and secure from all winds.

* Captain McGillivray when anchored here in the s.s. Go-ahead sounded over this bay, and found a detached reef with about two feet on it at low water springs (on which his boat bumped) one cable off the western entrance point of the cove; he does not know of the existence of the rock in the entrance mentioned above; his vessel was anchored at the entrance, and he found nothing of it.

DIRECTIONS.—Mercury Bay may be approached from the northward, either by passing outside the Mercury Islands, or by hugging the coast; the latter is always done by coasters and steamers.

If the outer passage is taken, there are no dangers which are not visible, except Richards Rock before described, which must be carefully avoided, lying as it does in the track from Cape Colville; between the Mercury and Alderman groups there are 40 fathoms water, decreasing gradually to 20 fathoms across the entrance of Mercury Bay.

The approach to Mercury Bay by the inner passage is between Great Mercury Island and Tepaki Point, which has some small islets off it, and is the north-west point of a sandy bay (Opito), where there is good anchorage with winds from N.W. to S.E. by the west. Vessels unable to get round Cape Colville will find shelter in the north-west part of the bay, observing that there is foul ground a short distance southward of Tepaki Point. Pass midway between the Mercury and Tepaki Point, keeping Opena half a point eastward of the Man Rock, and steer for the Man Rock, a small round islet over a mile to the eastward of the south-east point of Opito Bay, passing it to the southward; it is bold on its S.W. side. Half a cable south-eastward is a rock awash at low water. Between the Man Rock and the S.E. point of Opito Bay, which has some small islets off it, and nearly midway is a sunken rock; to pass to the eastward of which the hole in the Needle should be kept closed, as open it leads on to the rock. Having passed this danger a course must now be steered midway between Ohena and the Needle, passing the latter about two cables off, as it has some rocks adjoining.

Twins.—Having passed Koruenga Islets the Twins, a double conical islet one and a-half miles within, will be seen; it is steep-to.

About half a mile to the south-westward of the Needles is **Koranga Island**, stretching at right angles off the land for about four cables, with an islet off its extreme.

Matapana Bay lies nearly three-quarters of a mile to the westward of the islet, with five fathoms sandy bottom; off its west point a ledge of rocks extends one-third of a mile towards the Twins; after this the north shore is clear to Buffalo Bay.

The middle island in Mercury Bay (*Motu Korure*) has foul ground off its north-east and south-east extreme for two cables, but is bold to the westward.

Tower Rock (*Moturoa*) rises abruptly to a height of 188 feet, within one of the southern entrance point, and has also foul ground two cables round it.

A sunken rock exists about a quarter of a mile northward of the outer islet in approaching Mercury Bay from the southward, seldom showing, but breaks occasionally; there are from nine to thirteen fathoms round it; it bears N.N.W. three-quarters of a mile from Te-Tui or Mahurangi, the island forming the southern entrance point of the bay, and E. by N. one and a-half miles from Tower Rock. When the coast line to the southward of Mahurangi is opened out you will be clear of this rock to the eastward.

The passages among these islands about the southern entrance should be avoided.

There are no other dangers in Mercury Bay than those which have been mentioned until Shakespeare Cliff is passed; the soundings decrease gradually, there being ten fathoms on either side of Middle Island, and three and a-half to four fathoms up to Shakespeare Cliff, off which a vessel may anchor, with the cliff bearing from S. to S.S.E., but should not proceed higher—unless intending to enter Mangrove River—to avoid the Pandora Rock of eight feet and some detached banks of nine and twelve feet, which extend nearly half-a-mile off the east entrance point of the river and off the bay between it and Shakespeare Cliff.

Mangrove River.—To enter Mangrove River steer midway for Buffalo beach, at the head of the bay; by keeping the Twins just open of Koranga Islet, bearing N.E. $\frac{3}{4}$ N. Fly Bank is avoided (the north-western-most of the shoal banks just noticed), and when the eastern entrance point of river bears about S. by E. you will be past the banks, and may haul gradually up towards the mouth, till a distant round red hill is on with high

Pah Point (within the entrance on the eastern side), which leads clear of the spit off the western beach before reaching low Pah Point; then keep the eastern point on board in passing, and anchor three cables inside it in mid-channel. It is desirable to moor a little above the saw mills. The river above high Pah Point is navigable for vessels drawing eight or nine feet to the upper saw mills, some six miles above.

WATER.—Fresh water can be procured round the high Pah Point, and there is a carpenter's yard near the anchorage, where ships have been repaired. There is a good pier available for vessels of light draught.

GUM TOWN is situated about nine miles up Mangrove River.

The tides must be considered in entering Mangrove River, and vessels should go in at last quarter flood: it would be better to be there about slack water, for there is no room to round-to, and the tides run from three to four knots. The least water in the channel going into the river at low-water springs is 14 feet, at high water 21 feet.

The tides in Mercury Bay are scarcely perceptible on the south shore; but on the north shore, at springs, they run $1\frac{1}{2}$ knots; this can be taken advantage of in working in or out.

PILOT.—If on the approach of an easterly gale it is required to run for Mangrove River it should be taken as soon as possible, for the sea rolling into the bay would break across the shoaler parts of Buffalo Bay; one of the builder's men at the entrance of the river might act as pilot if required.

The northern shores of Mercury Bay are wooded; the treble peak rising above Mahunganape is 1,026 feet high; the south shore is barren and uncultivated.

BAY OF PLENTY (See Chart 2,527.)

The Bay of Plenty is the name given to the long extent of coast comprised between Mercury Bay and Cape Runaway, near the East Cape: a line drawn between these two points measures 120 miles, and the greatest depth of the bay from such a line is about 40 miles. There are a number of islands and detached rocks in this extensive bay; the only anchorage in it of importance is Tauranga harbour; the coast trends from Mercury Bay S.S.E. $\frac{1}{2}$ E. towards this harbour, a distance of about 55 miles.

Castle Island (*Ngatutu*), a small steep islet, lies S.E. by E. $\frac{3}{4}$ E. four miles from the N.E. point of Mahurangi Island; it is 50 feet high, white in colour, and steep-to; 39 fathoms will be found three cables distant. A heavy break was observed by Capt. McGillivray some two miles eastward of Castle Rock during a N.E. gale, but has not been seen since.

Aldermen Islands are a group of basaltic islets, with some outlying rocks like the stumps of trees, and—including off-lying rocks—occupy a space of over four miles north and south, and three miles east and west. They may be seen 10 or 15 miles off. The largest is on the southern side of the group, and is about 150 feet high. Half a mile eastward of it is a rock out of water. One mile north of it four islets extend E.N.E. and W.S.W. for about three miles. $2\frac{1}{2}$ miles N.W. by N. from the eastern islet are two rocks above water and one awash, and $1\frac{1}{2}$ miles W.N.W. of it are two more. These islets are nine miles from Tairua Head (the nearest mainland), with a depth of 25 fathoms in mid-channel. To seaward they are steep-to, there being 100 fathoms less than two miles off. The eastern islet when seen from a distance makes like a sharp pinnacle rock.

Tairua River.—Ten miles southward of Mercury Bay is Tairua River, available only for coasters; the intermediate coast is broken into sandy bays and clifty points, with from 20 to 14 fathoms water one mile off shore.

Shoe Island, when seen from the north-west, exactly represents its name, even to the tie; it lies E.N.E. from the north clifty head of Tairua (which is easily recognised by having two nipples on it), $1\frac{1}{2}$ miles distant, and is about one mile in circuit; half a mile eastward of it are some black rocks above water: it has a small coasters' harbour, with six feet at the entrance.

Slipper Island, so called from its shape, lies S.E. four miles from Tairua Head, and two miles off shore; it is nearly two miles long north-east and south-west; there are two islets off its south end, connected with each

other and the island by a reef awash at high water. The outer islet is near the extreme of the reef, which is about $1\frac{1}{2}$ miles from the island. A rock about 15 feet high lies nearly a quarter of a mile to the southward of the reef, and may be passed within a cable's length to the southward by vessels taking the in-shore passage, when—if coming from the southward—as soon as this rock is passed and the Shoe Island begins to open of the rocks which bear S. W. $1\frac{1}{4}$ miles from the north end of the island, and off which is a sunken rock which breaks heavily, steer midway between it and Tairua Head. Vessels can ride out a north-easter by anchoring to the westward of the south end of the Slipper in not less than five fathoms, as under this depth the water shoals suddenly. For shelter from a south-easter anchor in the bay farther north, abreast the house in six fathoms.

S.S.W. $2\frac{1}{2}$ miles from Slipper Island is the Warekawa Stream, at the southern termination of a sandy beach, $2\frac{3}{4}$ miles long.

Whangamata River is five miles southward of Warekawa Stream; its north entrance point is clifty, the south is a sandy point, with a round clifty islet (Clarke Islet) projecting from it. South-east of this islet, at distances of half a mile and one mile, are two smaller islands, the Wedge and Sugar Loaf. The two entrance points of the river project so as to form a bay outside, where a vessel may anchor with off-shore winds in four fathoms, half a mile from the shore, with the entrance open. Vessels entering or leaving require a commanding breeze, as the wind generally dies away between the heads, and should always use the flood tide. A sandspit makes off the south side of the entrance over which the tide sets, therefore keep the northern shore on board about half a cable off; the channel is about 200 feet wide. Two cables inside the heads is a bank with only five feet on it at low water, which has to be crossed, is only used by small coasters.

Mayor Island (*Tuhoua*) is 14 miles off the mainland, and 17 miles east from Whangamata River, with 50 fathoms in the deepest part between, and 40 fathoms within one mile of the island. It is $2\frac{1}{4}$ miles long N.W. and S.E., and $1\frac{1}{2}$ miles in breadth; its northern peak is 1,100 feet high; the centre is an extinct crater open to the S.W.; the west face of the island has a dazzling appearance when the sun shines on it. Half a mile east of the S.E. point is a rock under water, which breaks with a moderate swell; close off the north point is a small sugar loaf islet. At the S.E. extreme temporary anchorage with sandy bottom may be had, but exposed to W. and S.W. winds; there is also a small cove where coasters ride in northerly winds. From Whangamata River to Katikati River is 15 miles, with no dangers on the coast between them, there being nine fathoms within one mile of it, increasing to 30 fathoms six miles off shore.

Katikati River.—The entrance bears from Mayor Island S.W. by S. 15 miles; on the north side of the river is a sandy bay four miles long, and the coast to the southward, between it and Tauranga harbour, is a straight sandy beach thirteen miles in extent.

TE-HO, the north head of Katikati, is 170 feet high; two miles east of it the water shoals suddenly from 6 to $3\frac{1}{2}$ fathoms, and breakers extend one mile from the entrance, which appears to be choked with banks; there is, however, a narrow channel on either side of a middle ground at the entrance, with not less than one fathom at low water and deep inside. No definite information can be given owing to the shifting nature of the bar.* The Katikati River expands to a considerable width within, and is connected by one of its arms with Tauranga harbour, affording a channel which is used by small steamers of light draught at high water, thus forming a long sandy island between Te-Ho and Mount Monganui; at low water this channel is nearly dry.

Karewha.—W. by S. $\frac{1}{2}$ S. $7\frac{1}{2}$ miles from Te-Ho Head is the small rugged island Karewha, 350 feet high; it lies three miles off the sandy

* Captain Carey, of the steamship Keera, reports that in 1872 the bar, on which was a depth of 18 feet at high water neap tides, was $1\frac{1}{2}$ miles seaward of Te-Ho Head; to enter Te-Ho Head should be brought to bear W.S.W., then steer directly for it, keeping that course until within a quarter to half a cable of the head, then follow the land about the same distance until inside, where there is plenty of room, with seven or eight fathoms water.

beach, with a channel between of from ten to thirteen fathoms, sand and shell. Maunganui Hill at the entrance to Tauranga lies S.E. by S., six miles from it.

Tauranga Harbour* is the only harbour on the east coast between Mercury Bay and Port Nicholson that affords shelter in all winds for vessels of burthen; its entrance lies south 19 miles from the south end of Mayor Island, and W. $\frac{1}{2}$ S. 11 miles from the south end of Motiti Island.

The difficulty of entering this harbour through the deepest channel is its somewhat tortuous course, and the liability to eddy winds on rounding Mount Maunganui, the channel in one place being only half a cable wide; but with those winds which would make the Bay of Plenty a lee shore, Tauranga harbour is the most accessible.

The entrance to the harbour lies nearly north and south; the eastern head is the remarkable flat-topped hill Maunganui, rising abruptly from the sandy shore to the height of 860 feet, which makes like an island from seaward; the western entrance is formed by low undulating sandhills; one mile north-westward of Maunganui a spit with nine feet extends eastward from the western sandy shore for one mile, and generally breaks; occasionally in heavy weather there is a break in the entrance.

The approach to Tauranga Harbour is remarkably distinct. Vessels bound to it from the northward should bring the south end of Mayor Island to bear north, steering a south course; on this course Karewha will be passed on the outside about three miles, in twenty-three fathoms, when the islet Motu-otau, and a hummocky projection from the sand, both within one mile eastward of Mount Maunganui, will be seen; the soundings decrease gradually after passing Karewha Island, from fifteen to six fathoms within one mile of the heads.

Vessels bound for Tauranga harbour must bring the summit of Maunganui to bear south and not eastward of S. by E., and then steer for it until within two cables of the north rocks (or steer the course till you open out the pilot's house on S.E. side of the mount) thereby avoiding the bank extending from the west shore; the channel is one-third of a mile wide and deepens from $3\frac{1}{2}$ to 7 fathoms; as Maunganui is steep-keep not more than a cable from it till you open out the red buoy which is on the north end of inner middle bank—which runs north and south quarter of a mile with two fathoms at low water—in $5\frac{1}{2}$ fathoms; steer for it till you get the black buoy—which is in $3\frac{1}{4}$ fathoms—well open, when shape a course midway between the buoys; if flood, till the north end of Motu-Otau is open clear of Maunganui, when haul round towards the beacon on Stoney Point; if ebb tide, keep midway between the buoys till you get Motu-Otau well open, and you are well up to the second red buoy—which is at the beginning of the inner waters leading to Katikati—in $4\frac{1}{2}$ fathoms, before hauling round for Stoney Point. After Stoney Point is passed Maunganui is again steep-to, and a good anchorage will be found in the first sandy bight (called Pilot's Bay) a cable from the shore (vessels should moor here). Vessels proceeding above Maunganui will carry from five to seven fathoms of water for about a mile by keeping midway between the shore and the red buoys, till off a small rise on the left hand shore (Maketu Mound), immediately above which the channel divides, one arm running towards the westward and the other continuing towards Tauranga. There is good anchorage off Maketu Mound in five to seven fathoms. A buoy painted red and black marks the fairway between the two streams; vessels should not anchor above it; from here to Tauranga there are two channels, the main, close in to the eastern shore, has the greatest depth, but with a very sharp bend; after passing through the buoys at the narrows haul up for Cemetery Point, till having passed the black buoy off the sulphur works, when keep about a cable off that shore till abreast of the town, where you can anchor in $2\frac{1}{4}$ fathoms. The other channel (Stella) is more to the westward, and is marked with two black and one red buoys, has nearly a foot less water in it than the main channel. It is advisable for vessels of moderate draught to wait for nearly high water, as there is only eight feet six inches in the shallowest part of the main channel.

* See Admiralty Chart, Tauranga Harbour, No. 2,521.

CAUTION.—Vessels coming in should keep the course as near as possible on the ebb tide to avoid being set on to the Maunganui shore by the tide from the Katikati, which sets right across; the flood when abreast of Stoney Point sets on to the point, and in consequence of the narrowness of the channel here and the strength of the tide round Stoney Point, vessels entering the harbour should wait till nearly slack water; baffling winds will nearly always be met with under the mount.

There is another anchorage near the entrance to Tauranga which is reached by steering from abreast the outer red buoy so as to pass half a cable westward of the second red buoy, when steer for the R. C. Church on the Otomoiti (about S.W. by S. $\frac{1}{4}$ S.) which leads between the sand extending north-eastward from Pani-pani shore and a shoal bank to the south-eastward, passing Pani-pani Point about two cables off; thence at same distance off the northern shore till Maunganui is shut in, when anchor in about six fathoms. After passing the second red buoy the water shoals to $2\frac{1}{2}$ fathoms until near the anchorage when it deepens to $3\frac{1}{2}$ and up to six fathoms. The channel between the sand banks above mentioned off Pani-pani is very narrow, therefore strangers if unable to obtain a pilot should be very cautious in using it. From this anchorage vessels can leave without detention, whereas within Maunganui Bluff, the prevailing wind being westerly and the channel off Stony Point very narrow, a ship may be detained.

The strength of the tide at springs is three knots; in the narrow channel at Stony Point it may attain four knots.*

From Tauranga harbour the coast, a uniform sandy beach, runs E. by S. for 15 miles to Kaituna River. The land between is low, with the exception of two hill ranges of 600 and 800 feet, one mile inland; a remarkable flat-topped range of hills about 1,000 feet high rises 10 or 12 miles inland of Tauranga, and extends in a north-westerly direction.

Motiti Island lies $4\frac{1}{2}$ miles off this sandy coast, with 12 fathoms water midway between it and the shore, it is flat and triangular in shape, $3\frac{1}{2}$ miles from north to south, and $1\frac{1}{2}$ miles from east to west; the north end, which is the highest, is 190 feet high, and bears from Maunganui Hill E.N.E. 11 miles; there are two tidal rocks—four feet high at low water—E. by S. $1\frac{1}{4}$ miles from its south end, with another, awash, between them and the point. A shoal consisting of a narrow ridge, with from two to four fathoms on it, deepening to 10 fathoms rather suddenly to the south and east, and more gradually to the westward, extends from the south end of Motiti for a full mile in a S.W. by S. direction. Capt. McGillivray reports having seen two heavy breaks about two miles to the westward of the Okorapu Rock, and about one mile apart, on the same day that the shoal to the S.W. of Plate Island was seen breaking, when a heavy sea was running from the N.E. W. by N. $2\frac{1}{4}$ miles from the north end of Motiti, and in the fairway of vessels passing between it and Astrolabe Rock, is a dangerous rocky patch (Akorapu Reef) with five feet on it at low water, about 70 yards in extent; it bears N.E. by E. $\frac{1}{4}$ E. from Mount Maunganui.

Astrolabe Rock, extending E.N.E. and W.S.W. about two cables, lies north four miles from the north end of Motiti, with the flat top of Mount Maunganui exactly on a level with the ridge of the table land behind it; if a vessel is inside the rock the mount will appear above—or higher than—the distant land, if outside the contrary. The following are the bearings from the rock, viz.: Mount Maunganui S. W. $\frac{1}{2}$ W., centre of Mayor Island N. W., right extreme of Motiti S. $\frac{1}{4}$ W.

CAUTION.—This neighbourhood should be avoided at night, as Motiti is low, and no other land is near enough to be a guide.

Schooner Rocks lie four miles E.N.E. from N.E. end of Motiti, are nearly one cable in extent, bold to, and 62 feet high; there are 42 fathoms water between them and Motiti. A rock about three-quarters of a mile N. by E. $\frac{1}{4}$ E. from Schooner Rocks has been seen breaking.

Plate Island lies E. by N. 7 miles from the south end of Motiti; and S.E. $\frac{1}{2}$ S. $3\frac{1}{2}$ miles from the Schooner Rocks, with from 20 to 40 fathoms water

* Captain Freemantle, H.M.S. "Eclipse," says that, at half an hour before low water, the ebb tide runs between four and five knots at Stony Point, and the ebb stream runs out more than an hour after low water.

between them ; it is less than half a mile in extent, is 166 feet high, and has deep water all round, except a ledge just above water off its south end. A rocky patch three-quarters of a mile long in a S.W. direction by half a mile broad exists off Plate Island, least water found was three fathoms, with south end of Plate Island N.E. $1\frac{1}{2}$ miles.

Kaituna River.—Town Point (*Okure*), the east head of Kaituna River, is a cliff 100 feet high ; from it towards Motiti Island and Plate Island the ground is very foul, but the passage between is taken by steamers and coasters ; the entrance of the river is very narrow, and there are only three feet on the bar at low water : within, it expands considerably, and is navigable for boats eight miles up. W.S.W. of the river entrance, at distances of three and five miles, three remarkable clumps of trees will be seen rising out of the low land.

Waihi and Matata Rivers.—One mile south-eastward of Town Point is Waihi River, which runs in many branches through an extensive flat.

E. by S. $\frac{1}{2}$ S. 15 miles from the same point is the Matata River, with a straight sandy beach the whole way. The white cliffs coastwise north-westward of Matata rise to a height of 500 feet. There are three streams between the Waihi and Matata Rivers. At Matata River coasting vessels are built. From it a range of hills runs south for 12 miles.

Mount Edgcumbe (*Putanaki*) rises abruptly from the plain 14 miles southward of Matata to the height of 2,575 feet.

Eastward of Matata River, 13 miles, is the Whakatane River, with an extensive swamp at the back of the sand hills which skirt the coast between them.

Whale Island (*Motu Hora*) and **Ru-Rima Rocks.**—Off this part of the coast is the island Motu Hora and the Ru-Rima Rocks ; the former is N.W. by N. five miles from Kohi Point, Whakatane River, and four miles from the sandy shore of the mainland, with 13 fathoms water inside it. It is 1,167 feet high, $1\frac{1}{2}$ miles long east and west, and half a mile from north to south ; it appears bell-shaped from seaward, but on nearing it a second peak is seen on the west end. Vessels caught in this part of the Bay of Plenty in a north-easter might find shelter under a shingle spit off its S.W. end in six fathoms ; small vessels may get closer in under the shingle beach. As the island is small the back swell would be considerable, but it is the only spot in this part of the bay affording shelter. A sunken rock is said to exist $2\frac{1}{2}$ miles N.E. of Whale Island, but was searched for in vain by Commander Drury.

Ru-Rima, a dangerous cluster lying four miles to the westward of Whale Island, with a channel of from 18 to 20 fathoms of water, and a passage between the rocks and the shore of $2\frac{1}{2}$ miles, and depth varying from 9 to 11 fathoms. They form much the shape of a cross, extending lengthwise in a N.E. by N. and S.W. by S. direction $3\frac{1}{2}$ miles, and across nearly three miles. The highest rock on the easternmost part is 120 feet out of water, and lies west four miles from the north point of Whale Island. The inner rocks—at the foot of the cross—are awash, and three miles off the beach ; the outer rocks—also awash—are six miles from the beach. The western patches are also awash. Vessels passing inside should keep the shore on board, which shoals gradually.

White Island (*Whakari*), an active volcano, in latitude $37^{\circ} 30' N.$, and longitude $177^{\circ} 12' E.$, lies off the depth of the Bay of Plenty, 28 miles from the shore. It is about three miles in circumference, and 860 feet high ; the base of the crater is one and a half miles in circuit, and level with the sea ; in the centre is a boiling spring about 100 yards in circumference, sending volumes of steam 2,000 feet high in calm weather ; the whole island is heated so as to make it difficult to walk ; sulphur can be obtained here in large quantities. No animal or insect breathes on the island, scarcely a limpet on the stones, and 200 fathoms will hardly reach the bottom within half a mile of its shores. Half a mile off its S.E. extreme is an islet 30 feet high ; there is no appearance of any off-lying danger, and scarcely any tide is felt. This island is the eastern limit of that extensive belt of subterranean

agitation which extends from Mount Egmont through Tongariro, the Taupo and Rotomahana Lakes, to Whale Island and the adjacent rocks Ru-Riua, north of which line earthquakes are very rarely felt.

Volkner Islets are three rocky islets, from 80 to 150 feet above the sea, lying three miles N.W. by W. from White Island, with deep water between, and no off-lying danger.

Whakatane River.—Kohi Point, the north-east point of this river, is 637 feet high. The channel is between large boulder rocks just covered at high water, on either side of the bar, which at low water has only two feet on it, and 9 or 10 feet at high water springs. Whakatane River is a favorite port for the coasting trade. Schooners reach as far as Pupuaru, the mission station, three miles up, from whence the river bends to the south-east.

Ohiwa River is seven miles eastward of Kohi Point; it is broad at the entrance, being half a mile across at high water; within, it branches into three arms running through extensive mud flats; the bar, one mile seaward, is shifting and unreliable, the depth on it varies from 9 to 14 feet; between the heads the tides run very strong.

Half a mile eastward of Ohiwa River is a wooded cliff about 500 feet high, which, as it stands alone on the coast, is a good guide to this river; $2\frac{1}{2}$ miles eastward of Ohiwa River is the entrance to the Wai-otahi stream.

Opotiki River is six miles eastward of Ohiwa; the entrance is not more than a cable across; both heads are sand, with no natural marks to lead in. The bar changes with freshes, and north-east gales also affect it, the depth varying, but the river is navigable for ordinary coasters for one mile inside. Opotiki divides into two branches, half a mile within the points both running southward, and about two miles apart; the Church mission is on the western branch, three miles from the mouth; this river is in the depth of the Bay of Plenty; and seven miles eastward of it, the long extent of almost straight sandy coast may be said to terminate at Opape Point. *Note.*—Generally speaking, none of these bar entrances should be taken without good local knowledge, in consequence of their shifting nature.

SOUNDINGS OFF COAST.—The general depth of water from Kaituna River to this part of the coast, at 10 miles off shore, is 30 fathoms, mud, and at five miles, from 18 to 21 fathoms, sand. The flood tide runs to the westward along the coast.

FEATURES OF COAST.—From Opape Point the coast trends about N.N.E. 22 miles to Waikana Point, and its features are strikingly changed, being now broken into numerous small sandy or shingly bays with rugged cliffy points between. Three miles from Opape Point is Pehetaire Point, 800 feet high. The ground here shelves very gradually, having 18 fathoms, mud, five miles from the beach.

Nearly eight miles further north-eastward—with three bays between—is Koronohina Point, 240 feet high, and round it is built the large village of Tokata. One mile south of Koronohina Point is the small river Maraenui, expanding during freshes to half-a-mile in width, but in dry weather fordable half-a-mile from the mouth; its bar is 30 feet wide, and close to the shore; it is a tolerable boat harbour, having eight feet water within.

From Koronohina Point to Opokohino Point and the village of Omaio is $2\frac{1}{2}$ miles, with a rugged coast between. The peak over Opokohino Point rises to 600 feet.

Te Kaha Point is five miles further to the north-east; there are two bays between, and extending off the middle point which separates them is the small peninsula of Motu-nui, where coasters haul into five fathoms and ride out north-east winds. The bay to the south-west of it is shingle, and two small rivers empty themselves into it; the larger one is the Omaio.

Awanui River is nearly three miles north-eastward of Motunui Point, with a rocky shore between; it is visited by small coasters. From this river the coast turns sharply to the north-westward to Te Kaha Point for about $1\frac{1}{2}$ miles, with a rocky shore.

Te Kaha Point has outlying rocks half-a-mile round it; hence to Waikana Point, an old whaling station, is four miles; midway between them and a-half mile off shore is a reef awash, to keep clear of which steer

outside the line of the points. There are high wooded ranges a short distance inland; Mount Hardy, S.E. by E. nine miles from Te Kaha, rises to a height of 3,700 feet; also a coast hill immediately east of Point Waikaua, 860 feet high.

From Waikaua Point to Orete, the southern point of Wangaparawa roads, is N.E. nine miles; the first half of the distance, as far as Kotiki Point, the coast is steep and rugged, with 35 fathoms mud two miles off shore, decreasing to twenty fathoms at the same distance towards Orete Point; for the remaining distance there are shingle beaches and rocky points.

Immediately west of Orete Point there are sunken rocks three-quarters of a mile off shore, and the ground is everywhere foul within half-a-mile of the coast.

Cape Runaway, the eastern termination of the Bay of Plenty (easily known by its dark colour and oval shape, almost like an island) is nearly six miles north-eastward of Orete Point, and forms the north-east point of Wangaparawa roadstead; detached rocks lie a quarter of a mile northward of the cape, with twenty fathoms water near to, and six fathoms between them and the land. E.S.E. from these rocks is another awash at low water; it is recommended to give this cape a good berth as the tide runs strong in its vicinity, and generally a swell.

Wangaparawa Roadstead.—With south-east winds there is anchorage in this roadstead off what was a whaling station at two miles S.S.W. of Cape Runaway. Large vessels should not approach the shore within a depth of twelve fathoms, anchoring about one mile west of the conical hill over the station, south of which one mile distant is Wangaparawa, a fordable stream, up to which the coast is rocky, and landing bad; beyond it there is a shingle beach $1\frac{1}{2}$ miles long, and then about the same extent of white cliffs, 80 feet high; a ledge of rocks extends nearly half a mile off the south end of these cliffs, thence a sandy bay to the long low point Orete.

CAUTION.—Upon the slightest appearance of a westerly wind a vessel should not remain at anchor off the whaling station, as, although well sheltered from a north-east wind, it would be dangerous to attempt to ride a breeze out from that direction, these winds always shifting to the northward and westward, bringing in such a heavy sea as renders it very difficult to gain an offing.

The anchorage under Orete Point, about half a mile within it, affords excellent shelter in south-west and westerly winds, by bringing the outer extreme of the rocks extending off it to bear W. by N., and anchoring in from 10 to 7 fathoms, fine sand; a great objection, however, to the anchorage in Wangaparawa roads is, that between the changes from south-east to westerly winds there is frequently a calm, the westerly wind being preceded by a swell, and coming in flaws.

From **Cape Runaway** the coast trends to the eastward 17 miles to Matakawa Point, the north point of Hicks Bay. Lottin and Midway Points form a projection— $1\frac{1}{2}$ miles long—half way between, with small sandy bights (but no anchorage) on each side. The hills bordering the coast are steep and clothed with thick brush-wood, and vary from 1,000 to 1,500 feet in height; they are higher to the westward of Lottin than towards Hicks Bay.

CAUTION.—Should the wind fall there is no anchorage on this part of the coast, and a constant swell sets towards it.

Soundings in 20 fathoms will be had two cables off shore, and 40 to 50 fathoms within one mile.

Hicks Bay is nearly two miles deep by one and a half miles wide, and is open to the eastward. The north point, Matakawa, is a long low rocky tongue; the rocks off it are all visible, and there is 25 fathoms water within one cable of the entrance. The south point, Ko-hau or Iron Pot, is almost inaccessible.

ANCHORAGE.—Hicks Bay affords secure anchorage in all westerly winds from north to south; from north winds also, which are not uncommon, it is sheltered; but vessels must get well within Matakawa Point, the bottom is greenish mud and good holding ground, shoaling suddenly towards the

sandy beach at the head. The north and south shores are steep, generally faced by perpendicular cliffs and outlying rocks; the latter within half a cable of high-water mark.

North-east gales, which generally spring up from the eastward and gradually freshen, give sufficient warning to weigh. No vessel should lie here with north-east or south-east winds; from south-east winds, which are much more constant on this part of the coast than in the Hauraki Gulf, vessels may be sheltered by standing down towards the white cliffs, which are five miles south-eastward of Hicks Bay, anchoring in from 9 to 12 fathoms in the Kawakawa roadstead, one and a half miles westward of the Awatere River, and within one mile of the beach, when a vessel will be in a better position to fetch out on a change to the eastward coming on than if in Hicks Bay.

Awatere River is three miles E.S.E. from the south point of Hicks Bay at the eastern extreme of the sandy bay of Panaruku. Nearly a mile to the south-west of it is a table hill 960 feet high, and about the same distance to the south-east is a hill 1,100 feet high.

WATER.—Fresh water can be obtained in Hicks Bay from a gully within half-a-mile of Mota-kawa point; difficulty will be experienced in landing if the winds blows fresh outside, from a swell rolling into the bay; there is also a considerable stream of fresh water five or six feet deep in the north-west corner.

Supplies may be obtained from a native village (Wharekahika) in the south-west nook of the bay. The natives catch the hapuka fish off Ko-hau Point; just within this point is a very small but deep cove, used by the natives as their best landing-place, except the whaling station one mile from Motakawa Point, where the isolated rocks form a boat harbour.

From Hicks Bay to the East Cape.—From the north point of Hicks Bay to the East Cape Islet is E. by S. $\frac{3}{4}$ S. 14 miles.

SOUNDINGS.—The soundings five miles off this part of the coast are from 40 to 50 fathoms sand, which decrease rather gradually to 14 and 10 fathoms within one mile. Across the entrance of Hicks Bay and Kawakawa roadstead there are from 14 to 17 fathoms, and no dangers but what are visible.

The land about the East Cape has a very mountainous appearance; the summit of five distinct ranges may be seen backed by the snow-capped Ikaurangi, a conspicuous mountain, rising to the height of 5,535 feet, 28 miles south-west of the cape. The cape itself is of a remarkable white clayish sand, and this barren feature is continuous to Hicks Bay in steep cliffs to the westward, and in broken cliffs with valleys intervening to the southward.

East Cape Islet.—This islet is half-a-mile in circuit; it is steep, almost inaccessible, and bounded by rocks, with a ledge extending from its northern extreme, N.N.E. half-a-mile. There is a channel nearly one mile wide between it and the cape, at the northern entrance of which is a shoal patch of $2\frac{1}{2}$ fathoms; nearly one mile from this patch, and N.E. $\frac{1}{2}$ N. two-thirds of a mile from the north-eastern point of the cape, lies another patch with $3\frac{1}{2}$ fathoms on it, which breaks in heavy weather. As the winds are liable to die away suddenly this channel is not to be recommended, especially as there is generally a swell, and the tides run two and three knots. Within one mile of the islet the water shoals suddenly to twelve and nine fathoms, which latter depth will be carried to within one cable of it.

WINDS.—The winds on either side of the East Cape are frequently very different, although it may be blowing fresh. The strong westerly sea breezes which blow through the Bay of Plenty are suddenly lost when passing south of East Cape Islet, the distinct line of breezes being curiously depicted on the water, and a vessel may be becalmed here for hours in sight of strong breezes, and as there is usually more or less swell a vessel should be guarded on approaching the shore. There is good anchorage on either side of the cape, according to the direction of the wind, with regular soundings on a sandy bottom. This is very advantageous for vessels bound either way meeting a foul wind on rounding the cape, for, as the wind

usually blows along the land, smooth water can be found on one side or the other. Northward of the East Cape the flood tide sets to the westward, and southward of the cape it sets in a northerly direction. There are strong races extending some eight or ten miles off the Cape.

FROM EAST CAPE TO MAHIA, OR TERA-KAKO PENINSULA.

From the East Cape to Open Bay (*Waipiro*), a distance of twenty miles, the coast trends S. by W., varied by white streaked cliffs, with sandy beaches intervening, the country being more or less cultivated; the soundings four miles off the land are from 25 to 30 fathoms mud, and there are several rocks scattered along the shore within a mile off it.

Three miles south of East Cape is the Wakori Bluff, a cliffy projection, the land over it being from 500 to 600 feet high.

Waiaapu River is six miles from East Cape, flowing through a sandy beach; it is a considerable stream at high water, but the freshes come down with great violence, so as to render it unsafe as an anchorage even for the smallest vessels.

ROCK.—Between Waiaapu River and Wharariki Point, about one mile from the shore is a rock which bears N.N.E. $\frac{1}{2}$ E. $2\frac{1}{2}$ miles from Wharariki.

Wharariki Point is nearly four miles south of Waiaapu River. It is the south point of the Awanui stream, the land over it is 950 feet high. Rocks extend for half a mile round this point. There is landing on the north side of the point behind the rocks, which is used when the Waiaapu bar is unapproachable, but as there are several sunken rocks which only break in a heavy swell, it is not recommended for strangers. $3\frac{1}{2}$ miles southward of Wharariki Point at the south end of a sandy bay is REPOURA VILLAGE; cliffs extend for two miles southward of the village; and a little below the south point of the bay, and one mile off shore, are sunken rocks, with foul ground for half a mile outside them. Between the rocks and the shore are eight fathoms of water; two miles from the beach there is only ten fathoms.

Kaimohu, a round head 670 feet high, three miles northward of Open Bay, is the next headland. Sunken rocks extend off it for one mile to the eastward, and the same distance in a north and south direction; there are four fathoms close to them, and 17 fathoms two cables to the eastward.

Open Bay (*Waipiro*) will be known by Tawhiti hill, the highest on the coast, which rises two miles south of the southern head, and is 1,670 feet above the sea; its width is four miles from north to south, and depth little more than one mile. Waikawa stream is in the south-western corner of the bay; the landing there is generally difficult.

Off the north point (*Matahau*) is a reef which extends northerly for nearly one mile parallel with the beach, and a quarter of a mile off shore; within this reef boats can effect a landing, and whence produce is shipped; there are nine fathoms in the middle of the bay in a line between the heads; a rocky patch with two fathoms is said to exist in its north-west corner; another rock (*Tokamanza*) is said to exist one mile N.E. of Matahau Point. Close off the southern head is a small islet and some rocks. This bay can only be considered as a temporary anchorage, with off-shore winds.

From Open Bay the coast trends S. by E. for twenty miles to Tolago Bay (*U-awa*), the bays of Tokomarua and Waipara lying between. Some reefs lie off this part of the coast distant more than one mile.

SOUNDINGS.—The soundings are regular, in 30 fathoms mud, five miles off the coast, decreasing to 20 fathoms sand within two miles of it.

Tokomarua Bay is $3\frac{1}{2}$ miles from the south head of Open Bay; the coast between is composed of precipitous cliffs, backed by the hill Tawhiti, east of which, and half a mile from the cliffs, is the islet Mowhiauru, about 30 feet high, encircled by rocks.

KOATUNUI is the north cliffy head of Tokomarua Bay and Mawai—a sharp barren projection 400 feet high, with rocks extending a quarter of a mile off it—is the south point; they are four miles apart, and the bay is two miles in depth; two small rocks close together (*Hikutu*) awash at low water only, lie in the centre of it, one and a quarter miles from the beach and

N.W. by N. $2\frac{3}{4}$ miles from Mawai Point; there is also a reef on the south side of the bay half a mile in extent, and one-third of a mile off shore, which is visible.

SOUNDINGS.—There are 16 fathoms water across the entrance, and six fathoms inside the Hikutu rocks, which have 14 fathoms all round them; no vessels, except such coasters as know the channels among the rocks, should attempt this bay; it is moreover a very open anchorage.

St. Patrick's Cove.—On the south side of Mawai Point, taking its name from a curious pinnacle, which, seen from seaward, appears like the gigantic figure of a man with his arms folded.

Waipari Bay.— $3\frac{1}{4}$ miles from Mawai Point is Morahai Head, the north point of Waipari Bay, one and a half miles wide, and the same distance in depth, with sandy shores. The north point, and the whole of this bay, is rocky; three-quarters of a mile north-eastward of the north head is the small rocky islet of Motu-Ripa, with a narrow channel of five fathoms between it and the shore. Anaura Island forms the south head; it lies a quarter of a mile from the shore with a boat channel between, and extends three-quarters of a mile in an easterly direction; it is sterile and precipitous.

Marau Bluff is nearly seven miles southward of Mawai Point, and $4\frac{1}{2}$ miles northward of Tolago Bay; a reef of rocks awash—always breaking—(Tokamapuhia) lies rather more than a mile eastward of this bluff, and extends in a N.N.W. and S.S.E. direction for more than half a mile.

Tolago Bay (*U-awa*) is one and one-third miles across, N.N.W. and S.S.E. from head to head, and about the same distance in depth, with anchorage in all westerly winds from north to south. The north head rises to 400 feet, and the south to 890 feet, both of white marl.

Spring Island, three-quarters of a mile long in a north and south direction, lies immediately off the south head of Tolago Bay, surrounded by rocks, which extend a-third of a mile off.

Off the north head of the bay is an island (Motu Heka) surrounded by rocks; and again north-east of the latter is a reef (Tatara) always breaking, its outer limit being one and a-half miles from the north head. There is a passage of a quarter of a mile between the reef and Motu Heka, with a depth of eleven fathoms.

Tolago Bay is clear of dangers; there are ten fathoms sand between the heads, shoaling everywhere gradually, and five fathoms within half-a-mile of the sandy beach. On the setting in of easterly winds, vessels should leave in good time, for the outer reef renders the beating out somewhat tedious. Water may be had in Cook's Cove within the south head, but is difficult to get in the dry season. Tolago Bay is in steam communication with Gisborne.

Uawa River is at the head of Tolago Bay, with a bar of five feet, which is said to be constantly shifting; coasters have occasionally entered it; the principal branch has its rise to the northward.

The river is navigable, when inside the bar, and has been ascended for sixteen miles by a steam vessel of six feet draught.

Motara Bluff and Islet.—Motara Bluff, a cliffy point with an islet and some rocks extending a third of a mile from it, is $2\frac{1}{2}$ miles S.S.E. of the south head of Tolago Bay; from it Gable-end Foreland (*Pari-nui-te-ra*) bears S. $\frac{1}{2}$ W. 7 miles; rocks extend at low water half a mile off the coast between.

Cape Gable, or Gable-end Foreland, appears from the eastward like the white-washed gable-end of a house; there are two patches of detached rocks one and a half miles north of the cape, about three-quarters of a mile from the beach; and a small islet one-third of a mile south-east of it, with a reef extending half a mile in the same direction. A reef also extends south of the cape a distance of two miles.

ROCK.—The steam vessel *Star of the South*, in March, 1865, is reported to have struck on a rock about three miles S.S.E. of Gable-end Foreland; from the rock Whangara Islet bears W.S.W. about three miles.

From Gable-end Foreland the coast trends S.W. by S. for 15 miles to Tuae-hini Point, the north head of Poverty Bay (*Turanga*); the shore between is rugged, with sterile hills 600 feet high. Rocks extend a mile from the projecting points, having sandy bays within them, faced also by rocks.

Poverty Bay (*Turanga*) is five miles in breadth from head to head, which lie north-east and south-west of each other, and are the southernmost white coloured projections on the coast, until Table Cape (24 miles further to the southward) is reached; the bay is four miles in depth.*

CAUTION.—The South, or Young Nick's Head, is 520 feet high, and has anchorage one and a half miles within it in $3\frac{1}{2}$ fathoms, half a mile off shore, but it is advisable not to approach the shore nearer than half a mile in entering, as the ground is very foul, changing from eight fathoms to nine feet.

The North Head (*Tua-hini*), 260 feet high, has also a foul rocky ground, extending to the south-east for two miles; at this distance it shoals suddenly from 16 to 8 fathoms.

ANCHORAGE.—On the north side of Poverty Bay, one mile inside the outer point, is *Tua-Motu*, which appears an island, but is joined to the main at low water; off this peninsula a reef extends two cables to the southward, and between it and *Turanganui* River are rocks half a mile from the shore, the outer ones of which are covered or awash at low water; the bottom is sand, and the soundings decrease gradually from 12 fathoms across the entrance to 5 fathoms, half a mile from the beach. It is recommended to weigh on any appearance of a breeze from the south-east, for from this quarter it freshens suddenly, and several vessels have been lost by waiting too long. Capt. Kennedy, s.s. *Hawea*, reports having struck with the following bearings, viz., *Tua-Motu* (outer extreme) E. $\frac{1}{2}$ S., and *Pah Hill* (a peaked hill half way between the island and *Turanganui* River) N.E. $\frac{1}{2}$ N. A buoy is moored in the vicinity of the *Luna*, or *Pinnacle Rock*, outside the beacons, in $2\frac{1}{2}$ fathoms. The best anchorage for ships is about three-quarters of a mile to the S.W. of it.

Extract from "Gazette," 1879:—"A rock with only six feet at low water exists about 100 feet E.N.E. of *Pinnacle Rock*; vessels should not anchor within a cables' length of the *Pinnacle Rock* buoy, which marks the position of both rocks, and if bound for the river they should bring it to bear well to the eastward before hauling up."

Rivers in Poverty Bay.—There are two small rivers in the bay, *Turanganui* and *Koputetea*.

Turanganui River is two miles westward of *Tua-Motu* Peninsula, and is the northern termination of a sandy beach extending eight miles from the south head.

HARBOUR MASTER'S DIRECTIONS.

"*Turanganui* bar is very uncertain. Sometimes after long continuance of southerly winds it is close in to the outer stake, and after a heavy flood nearly out to the *Luna* (or *Pinnacle*) *Rock* buoy. The stakes are placed to shew the channel past the rocks up the river. The present leading marks over the bar to the outer stake are the *inner* (sloping) stake on with a yellow house on the river bank near the galvanized iron store. Follow the stakes keeping them on starboard hand, and when abreast of inner one, keep a verandah house on starboard side of river (entering) on with end of galvanized store until abreast of *Waikanae* River, then keep about mid river until abreast of iron store, and haul in to the wharf. There is a shoal point just outside the store. After a heavy fresh the bar nearly dries at low water, but a channel breaks out along the beach to the westward with deep water; this gradually closes in with the beach, and the bar deepens a few days after the flood has subsided. At present there is seven feet at high water springs on the bar. The best anchorage for steamers and coasters is in six fathoms with the flagstaff N.N.E. The bottom to westward of this is rocky. A red light is exhibited at the flagstaff 38 feet above high water, showing all round to seaward, and visible six miles."

Water can be had in abundance.

* The master of the ship *Excelsior* in 1873 states that the anchorage at Poverty Bay is good, the ground being stiff clay, there is no fear of dragging, and from strong south-east winds, which are rare in summer, a ship loading in the bay could find shelter under Young Nick's Head.

Gisborne.—The rising town of Gisborne is situated on the right bank of the Turanganui River, near the entrance (see introduction). The depth in the river varies from three to six feet at low water up to the wharf.

Koputetea River has about the same water on the bar as Turanganui, but it is less easy to define; its entrance is N.W. $2\frac{3}{4}$ miles from Young Nick's Head; it is a much larger river than Turanganui, and a fine sheet of water when the tide is in, and flows through one of the richest valleys in New Zealand. It is much exposed to the surf, which at low water breaks across the bar, and even during still weather it does not appear safe for a boat, except at high water or half tide. The flood tide outside sets to the northward, and ebb to the southward, and their influence extends ten miles from the shore; within Poverty Bay the tide is scarcely perceptible.

SOUNDINGS.—From Young Nick's Head, Poverty Bay, to the neck of the Mahia Peninsula, a distance of nineteen miles, the coast is bold, and may be approached as near as convenient; 24 fathoms will be found at two miles distant from the shore, and ten fathoms at one mile.

Ariel Rocks, a very dangerous outlying reef, which breaks only in heavy seas, bears E. $\frac{1}{2}$ N., ten miles from Tua-hini Point, the north head of Poverty Bay. E. by S. $\frac{1}{2}$ S. $8\frac{1}{2}$ miles from False Gable, the nearest land, and S. by E. $\frac{1}{4}$ E. 10 miles from Cape Gable end Foreland; the shoalest part is about half a mile in extent north and south, with twelve feet on it at low water springs; they are steep-to, shoaling at one cast from twenty-three to six fathoms, within half a cable of the shoalest part; there are 31 fathoms, green mud, between it and the shore, and 20 fathoms one mile to the northward, where it shoals more gradually than from the other sides. The vicinity of this reef may be known by the bottom being composed of coarse gravel and stones within a radius of two miles; if the soundings exceed 35 fathoms a vessel is to the eastward of the reef.

CLEARING MARKS.—The distance from the shore will render clearing marks available only in clear weather. When Tua-Motu just opens like an island a vessel will be only half a mile north of it; also the top of the white Gable is nearly on a level with the land behind it, when at the reef.

Mahia, or Terakako Peninsula, 12 miles long in a north and south direction, and nearly nine miles north-east and south-west in its widest part, forms the northern head of Hawke Bay. It is connected with the main by a sandy neck two miles long and three-quarters of a mile broad; a river flows through this neck and runs into the sea on the eastern side, which, when it is swollen, gives Mahia the appearance of an island.

Wangawai Road.—On the north coast of the peninsula, three miles west of Table Cape, there is a good roadstead off the Wangawai River, affording shelter in south and west winds; the anchorage is in 10 fathoms mud, Table Cape bearing E. $\frac{1}{2}$ S., and one mile north of the river; it is safe during the ordinary sea breeze, but care must be taken to leave on the approach of easterly winds. Small coasters can enter Wangawai, as it affords anchorage in six feet; from thence to Table Cape the ground is foul, and rocks awash extend from the south shore north of the cape nearly one mile.

Table Cape, the N.E. extreme of Mahia Peninsula, is 21 miles S. by E. $\frac{1}{2}$ E. from Young Nick's Head, from it the east coast of the peninsula trends S.S.W. 12 miles to its extreme point, and is studded with off-lying dangers, the first being a reef three miles S.S.W. $\frac{1}{2}$ W. of the Table Cape, extending three-quarters of a mile from the shore, off Taiporutu. One mile farther south is a detached reef (Hawini) three and a half miles long; the outer ledge two miles from the shore, and leaving a channel within, half a mile broad, sometimes taken by coasters, but not recommended; the northern extremes of the Hawini Rocks are six feet above water, the rest covered and only occasionally break. Three miles S.E. by S. of this ledge is the Bull Rock with eight feet on it at low water, which breaks with strong winds, it bears E. by N. northerly from the south point of the Mahia Peninsula $3\frac{3}{4}$ miles, and N.E. $4\frac{1}{4}$ miles from the south extreme of Portland Island. The red light on Portland Island lighthouse shews over this reef, and should not therefore be opened out. 20 fathoms will be found within $\frac{1}{3}$ of a mile round the rock. Another reef exists midway between this danger and the extreme of Mahia;

it appears to be a narrow ledge extending one cable north and south, and a channel within; its centre is two miles E. by N. $\frac{3}{4}$ N. from the south extreme of Mahia; there is about eight feet of water on it, it breaks with a swell. In a heavy S.E. sea a very heavy break was observed between the lighthouse and Bull Rock, about three-fifths of the distance from the island to the rock.

Portland Island.—South of Mahia Peninsula extreme one mile is Portland Island (*Te Houra*), nearly two miles in length in a N. by E. and S. by W. direction, of moderate height, with a flat summit and a few bushes on it. A channel, one quarter of a mile wide, with six fathoms, exists between the peninsula extreme and Portland Island; it borrows on the Mahia shore, but the rocks extending off either coast show: if a vessel is caught in a southerly gale and cannot weather Portland Island this channel is available, but as it leads among the rocks previously described it cannot be recommended. The tide sets through with a force of two knots. The south extreme of Portland Island is foul half a mile from the shore. The lighthouse on Portland Island is on its southern extremity; the tower is 28 feet high, painted white, shewing a *white revolving* light, attaining its greatest brilliancy every thirty seconds, 300 feet above the sea level, and visible 24 miles in clear weather. From the lower part of the tower a *fixed red* light is shewn, with an arc of six degrees over the Bull Rock, which bears N.E. four miles from the lighthouse.

Coast Navigation.—The east coast of the North Island from the East Cape to Hawke Bay, a distance of nearly 100 miles, has only two roadsteads for ships of burthen, viz., Poverty and Tolago Bays, and has many dangers within a league of it, so that even in fine weather and with westerly winds there are few spots where cargo can be shipped by vessels anchoring cautiously off it. There are indeed few places, if any, where even coasting vessels would be safe in a gale, for the rivers are only accessible in fine weather at the proper time of tide.

SOUNDINGS.—Besides carefully avoiding the Ariel Rocks, and the off-lying dangers from the Mahia Peninsula, a stranger should not approach this part of the coast nearer than a league; the soundings will be found to decrease from about 40 fathoms at two leagues off shore to 24 fathoms at one league; the bottom being green mud outside 24 fathoms, and fine sand within that depth.

TIDES.—Advantage can be taken by standing off or in shore according to the tide, which is felt to a distance of 15 miles off; within four miles of the shore the springs run two knots and the neaps one knot an hour; near the projecting headlands they are more rapid, and either tide, striking against a point, has a tendency to set off it.

FROM MAHIA PENINSULA TO CAPE PALLISER.

With the exception of the anchorages in Hawke Bay there may be said to be none between Mahia Peninsula and Cape Palliser, a distance of 180 miles.

Hawke Bay from Mahia Peninsula, its northern limit, to Cape Kidnappers, its south extreme, is 42 miles in a north-east and south-west direction; the depth of the bay is 22 miles; it is entirely open to south-east winds. The principal anchorages are off Long Point, at Ahuriri, and at Cape Kidnappers. Long Point affords shelter during north-east and south-east gales, and Cape Kidnappers in south-westerly.

Long Point Roadstead (see plan on Port Napier plan) on the north-east extreme of Hawke Bay is sheltered from all winds but westerly. The holding ground is not always good, but by anchoring a mile N.N.E. from Long Point there is good protection from the black north-easter,* and ample room to weigh, taking care to avoid (if necessary) the shoal patch of $2\frac{3}{4}$ fathoms which lies three cables S.W. by W. from Moemoto Head, and N.N.E. $1\frac{1}{2}$ miles from Long Point. To ride out a south wind get well and close inside Long Point, until an opening or cleft shows itself; with the

* It frequently blows from the north-west in Hawke Bay, while it is north-east at Long Point; the neck of low land causing the in-draught. The black north-easter is so called as distinguished from the summer sea breeze from the same quarter.

point south-west, in seven fathoms blue clay, this is the best holding ground. The cliff within the point is a steep-to, but vessels should be prepared to take an outer berth when the gale abates, and if a south-west wind sets in to proceed to Wangawai road.

WATER.—Long Point affords an excellent supply of water.

ANCHORAGES for small vessels accustomed to the place will also be found under Black Reef Point, which lies nearly midway between Long Point and Portland Island, and under Waikokupu, near the western shore of the sandy neck of the peninsula.

Rivers Wairoa and Mohaka—Twenty miles westward of Long Point, on the north shore of Hawke Bay, is the entrance to the river Wairoa,* and 11 miles farther to the south-westward is the small river Mohaka, but the entrances are difficult; the mouths also shift, and a south swell detains vessels inside with the chance of being blocked up.

“The depth on the bar of the Wairoa varies from four to eight feet, it is always shifting. Vessels drawing seven feet may enter with smooth water, but in all cases strangers should wait for a pilot. Several small steamers trade between this place and Napier.

“The Mohaka can be entered by vessels drawing not over four feet water. Great care should be taken in landing, as there is a bar at its mouth, also a heavy surf on the beach, unless after a continuance of strong land breezes. A small steamer runs regularly to Mohaka.”—*Napier Almanac*.

TIDES.—It is high water, full and change, at Wairoa River at 6h. 45m.; springs rise seven feet, neaps four feet.

The anchorages of these rivers are available in fine weather, but a heavy ground swell sets into the bight of the bay. On the approach of a south wind it has appeared ready to break in 12 fathoms.

Eleven miles south-westward of Mohaka, and under the highest bluff, is the small boat harbour of Waipapa, and seven miles farther, the small headland Whakaari, which affords partial shelter for small coasters. Whakaari forms the north extreme of a sandy bay, eight miles in extent in a southerly trend, terminating at Ahuriri, Port Napier.

Ahuriri, or Port Napier (See plan.)—This port is adapted to vessels drawing 10 or 11 feet water; it is the only harbour between Tauranga and Port Nicholson. The south head is a cliffy bluff, which, rising out of the low land, appears like an island; the entrance is narrow.

AHURIRI ROADS.—The anchorage is in six fathoms good holding ground, about one mile off the harbour entrance, with the bluff just described, bearing S. E. by E., Cape Kidnappers being shut in. These roads are safe in south, south-west, and north-west winds, and during the ordinary summer north-east sea breezes; the black north-easters give ample warning of approach.

Commander Sullivan, H.M.S. Harrier, remarks: “We found the anchorage anything but safe with southerly or south-west winds, a tremendous swell setting into the bay, causing ship to roll 33°. On the 23rd April best bower cable parted abaft the bitts; force of wind at the time, 4, S. S. W.”

LIGHTS.—A fixed *white* light, 160 feet above the level of the sea, is shown from a tower 20 feet high on the eastern side of Napier Bluff, half a mile south of the extreme point, and should be seen from a distance of 18 miles in clear weather. There is a fixed red and white light on the Eastern Spit, showing red between S. W. $\frac{1}{2}$ S. to S. W. by S. $\frac{1}{2}$ S., white between S. W. by S. $\frac{1}{4}$ S. to S. by E. $\frac{3}{4}$ E., red between S. by E. $\frac{3}{4}$ E. to S. E. by S. The bearings are towards the light. The light is 27 feet above high water, and visible in clear weather about 7 $\frac{1}{2}$ miles. The Pania Reef is in the centre of south-western red light, which is seen a quarter of a mile on each side of the rock. The Bluff bears from this rock S. by W. $\frac{1}{2}$ W. 2 $\frac{3}{4}$ miles.—Harbour-master's Remarks.

* We found the Wairoa, a considerable river, had changed its mouth within the last three years, having shifted 1 $\frac{1}{2}$ miles to the eastward. The entrance is very difficult, but within it has a depth of 12 to 14 feet, and navigable for boats 12 miles.—Commander Drury, in New Zealand Government Gazette, July 5, 1855.

The entrance of the river is narrow, and has a considerable bar; the tides run six or seven knots, there is consequently great difficulty in entering with boats. It is a fine river inside.—Remarks: Commander Freemantle, H.M.S. Eclipse, 1866.

CAUTION.—Vessels must be careful not to mistake the white sector of the light on the spit at the entrance of the port for the light on the bluff.

Pania Reef.—In approaching Ahuriri roads care must be taken to avoid this reef which has only seven to eight feet on its shoalest part, bearing N. by E. $\frac{3}{4}$ E. from the bold white cliff on the bluff, two miles distant; the bottom is uneven to the north of this reef, which is of small extent, and marked in the chart as a rock.

BUOY.—A *white* conical buoy lies in nine fathoms water at about a cable S. by W. from this reef, with the bluff bearing S.S.W. nearly, distant two miles.

Auckland Rock lies nearly half a mile N. by W. $\frac{3}{4}$ W. from the bluff extreme, with Cape Kidnappers S.E. $\frac{1}{2}$ E. and the west point of the bluff S. W. by W.; there is eighteen feet on it at low water.

MOORING BUOYS.—There are two mooring buoys in six and seven fathoms water, in the south-west part of the roads W.N.W. from the bluff, and about a mile from the shore. The moorings are placed in the best holding ground, and are sufficiently strong for a vessel of 1,000 tons. They are used by ships loading wool; when more than two are here at the same time the anchorage given in Harbour Master's directions appended is used. Several small steamers, etc., take out the cargo to the vessels loading, which generally make all snug by sending down all top hamper, top-gallant masts, etc.

WATER.—The only fresh water available for ships within three miles of the entrance to Port Napier is from a tank which holds about sixteen tons of rain water. The surf on the bar renders watering a precarious operation.

The proper time to approach the harbour is when it is high water by the beach; there will then be sufficient stream to enter. Vessels drawing six to seven feet water should anchor off M'Kain's hotel, as there is less tide there.

The following information is furnished by Captain Kraift, Harbour Master, viz. :—

“The Port of Napier consists of the Ahuriri roadstead which has good anchorage, but is exposed to the easterly winds, and of the inner harbour, which is perfectly land-locked. Works have been recently completed at the entrance which have had a very beneficial effect in increasing the depth of water upon the bar, and when the contemplated improvements for accommodation are completed inside, the inner harbour will be available for vessels of fair burthen.

“**TIDES.**—The flood sets into the bay from the south-east; the ebb sets to the north and east. The ebb tide from the inner harbour sets N.W.; in the entrance the strength of the current is from six to seven knots. It is high water at 6h. 0m. full and change, rise five to four feet; in the bay the tides are slack. The tide runs into the inner harbour for 1h. 30m. after high water, and flows out for 1h. 50m. after low water.

“The best anchorage in bad weather in the roadstead is near the mooring buoys, where there is seven fathoms, the Bluff bearing S.E. by E. $\frac{1}{2}$ E. Vessels on entering should keep well off the Bluff to avoid the Auckland Rock. Vessels at night should cross the first red and the white light, and drop anchor on entering the second red light. At present a small green light is shewn on each of the pier heads, but a fixed white light is to be placed on the head of the eastern pier, when the green and red and white lights will be dispensed with.”

The following information is from the Marine Department, viz. :—

“A rock with only nine feet of water exists with the extreme of the Bluff bearing West, and Cape Kidnappers S.E. Vessels should not endeavour to pass inshore of this rock or the Pania Reef. The ordinary anchorage is about three-quarters of a mile from the flagstaff, with the bluff bearing S. by E. in three or four fathoms. It is not safe for vessels to enter the harbour without a pilot. Vessels approaching from the north should keep in the white light (on eastern spit).”

WINDS AND CLIMATE.—The winds in Hawke Bay are very uncertain, the sudden south-easters make it necessary to be cautious when trading off Wairoa and Mohaka; the southers give more warning, by an overcast sky, but are violent, especially in the winter. The westerly winds occur chiefly

in October and November, blowing very strong with a low barometer, but generally fine weather. The black north-easter may be expected about once a month; this gale comes on very gradually, but blows very hard towards the end, accompanied by rain, veering to north-west and south-west.

The ordinary summer wind is a fine north-easter, with hazy weather, setting in at 10 a.m., and dying away at sunset, succeeded by a land-wind. The barometer rises to north-east, south-east, and south winds, and falls to north, north-west, and westerly winds. Rain may be expected with north winds and the black north-easters, and often with south-east winds; sometimes dry south-easters last for many days.

NOTE.—The works recently constructed are a pier or breastwork from the bluff point within the harbour on the south-eastern side to within a short distance of the eastern spit point, inside which, on the flat now reclaimed, is the railway terminus site. Along the outer end of this pier vessels lie, grounding in the mud at low water. Between the end of this pier and the inner part of the eastern spit there is still a narrow channel leading into what was formerly known as the Iron Pot, and which is still used by the small local steamers and coasters going to the wharves which lie inside. From both the entrance spit points breastworks have been carried out seawards to near the bar, for fully two cables, a full half-cable apart; the western one ends a little south-eastward of the Rangatira bank. The bar, which is about a cable beyond the ends of these breastworks, usually shifts with every gale; and on these occasions is invariably re-sounded by the Harbour Master before attempting to take vessels over it. These works—as pointed out by the Harbour Master—have necessarily the effect of scouring and deepening the channel.

From Ahuriri Bluff a sandy beach extends ten miles to the southward; the rivers Ngararuro and Tuki-Tuki disembogue respectively five and eight miles from the bluff.

Cape Kidnappers is a high point with white cliffs on either side; and two remarkable white rocks off the extreme. Cape Kidnappers anchorage is the shelter afforded by a reef extending from a point one mile westward of the cape. Here a vessel can ride out south-east and south winds—the anchorage has otherwise little to recommend it; the landing is bad, and no water or stock can be procured. Vessels should be ready to weigh when the wind veers eastward of south, as a heavy swell then sets in.

Vessels from the southward bound to Napier should not approach the Cape within two miles, on account of the foul ground extending around it. The steamer "Lord Ashley" is reported to have struck on a sunken rock with the Cape bearing S.E. by S., one mile, and half a mile from Black Reef.

There are from 40 to 70 fathoms across the entrance of Hawke Bay, a general depth of 20 to 30 inside, and 7 to 12 fathoms one and a half miles from the shore.

Cape Kidnappers to Cape Turnagain.—From Cape Kidnappers to Cape Turnagain, 56 miles, the trend of the coast is S. $\frac{1}{2}$ W., offering no remarkable feature; there is a sandy beach for the first nine miles; the small island Motu-Kura (or Bare Island), one and a quarter miles from the coast, is thirteen miles from it; the Capstan rock, above water, lies three-quarters of a mile S.W. of Bare Island.

Southward of Bare Island the coast is rocky, with some detached patches lying nearly a mile off shore; nine miles distant from it is the Manawarakau River and Pah; a reef above water lies immediately off the mouth of this river, extending north and south for one mile; eight miles south of Manawarakau is Tungara Cove, with anchorage for coasters, but considered dangerous; a reef extends off each point of this cove; it is rocky within.

Black Head (a clifly point) is seven miles southward of Tungara Cove. "It affords shelter during northerly and all off-shore winds under the reef extending to the S.E. from it. In fine weather handy vessels may anchor in four fathoms, with extreme of Black Head N.N.E. one mile, just open of a flat top rock nearing landing-place."—*Wellington Almanac*.

Oputu or Shoal Bay, a slight indentation of the coast, is nearly half way between; on each side of which to the Cove and to Black Head fringing rocks extend half a mile off shore. Immediately southward of

Black Head is a small islet half a mile off shore. Parangahau River is four miles south-westward of this; and fourteen miles beyond is Cape Turnagain.

Cape Turnagain (Te-poro-poro) is a well-marked cliffy projection, making as a white bluff from the northward, and as table-land from the southward (in the old charts its position was marked $8\frac{1}{2}$ miles N. by E. of the one at present assigned to it). Another hill, the chalk Nipple, so called from its white appearance, rises immediately over the coast three miles to the northward of the cape; there is a mile of beach close to the north of the cape, where boats may land in moderate weather.

From Cape Turnagain the direction of the coast is S.S.W. for 30 miles to Castle Point, with sloping grassy hills from 500 to 1,200 feet high; the shore is frequently faced with rocks. No stranger should approach the coast within a league between it and Cape Palliser.

Soundings in 30 fathoms mud three miles from the shore. (NOTE.—The sheet chart shows the 100 fathoms line at six miles off the Cape).

Castle Point from the north presents the appearance of a square tower at the extreme of a low point; there is a sandy bay two miles long to the northward of it "affording anchorage with winds from N.N.W. round by W. to S.S.W. in $2\frac{1}{2}$ to 3 fathoms water, about two cables from the extreme of the point in line with the northernmost house in the village. Vessels should be ready to weigh if the wind veers east of south."—*Wellington Almanac*.

Soundings.—Ten miles from the shore there is 60 to 70 fathoms.

Flat Point is 24 miles S.S.W. of Castle Point, a low projection with a sandy tongue running a short distance out, and a rocky ledge extending one mile northward.

Flat Point and the coast for the distance of 12 miles south-west of it is fronted with outlying sunken rocks. H.M.S. "Eclipse," in December, 1864, found one awash at one and a half miles E. by S. $\frac{1}{2}$ S. from Flat Point; also a reef $2\frac{1}{4}$ miles from this rock running in a north-east and south-west direction, nearly $2\frac{1}{2}$ miles, Flat Point bearing from it S.W. $\frac{1}{2}$ S. 2 miles. The Kahou Rocks, a small cluster above water, lie fully one mile off shore, with a depth of 49 fathoms one and a half miles to seaward; they are distant nine miles from Flat Point, and 29 from Cape Palliser. They should be approached with caution at night. The s.s. "Rangitira" is reported to have grazed (in thick weather) a rock or shoal not marked on the chart, lying it was supposed E.N.E. some two miles from the Kahau Rocks. The caution to keep one league off the coast is therefore peculiarly applicable to this part.—See Sheet Chart.

From Flat Point to Cape Palliser is S.W. $\frac{1}{2}$ S. 40 miles; the coast line is itself low, formed of sand and shingle beaches with rocky points, and ledges extending in places one mile off shore; the depth of water being 48 and 50 fathoms, $2\frac{1}{2}$ miles from the land; the seaboard presents a succession of level table steppes, and the ranges increase in elevation as Cape Palliser is approached, where a high steep and sterile mountain range attains an elevation of 2,850 feet within two miles of the Cape.

Cape Palliser, the south extreme of the North Island of New Zealand, and the south-east entrance point to Cook Strait, is a remarkable bold-looking promontory from a distance; two low shelving points extend from it to the southward; a reef, partly above water and awash, extends half a mile from the eastern of these two points, and the Black Rocks, 15 feet above water, one mile from the western; strong tide rippings also extend one and a half miles from the cape, and vessels should not round it within two miles even in fine weather; at this distance there are 35 fathoms, sand and shells. The 100 fathoms line is here, only three miles off.

COOK STRAIT.

(See Chart of Straits).

VARIATION IN 1875.

Port Nicholson, $15^{\circ} 25'$ E. | New Plymouth, $14^{\circ} 55'$ E.

CAPE PALLISER TO NEW PLYMOUTH (TARANAKI).

The navigation of Cook Strait—separating the two principal islands of New Zealand—and which is daily increasing in importance, being the high-

way of the fleet of intercolonial steamers and coasters, and also occasionally used by such homeward-bound vessels from Australia as prefer this direct route to passing either north or south of New Zealand, is rendered difficult by the strong winds and at times furious gales, and the strong tides and races, to which the configuration of its shores renders it liable. There are but few actual dangers; its south shores abound in secure harbours, easy of access either in N.W. or S.E. gales, which are the prevailing and indeed the only winds that blow with any violence. The latest Admiralty Charts are excellent; with them, and exercising due caution and vigilance, the straits may be navigated with confidence. A description, beginning at Cape Palliser, and taking first its northern shores, now follows.

When abreast of and two miles off the Black Rocks off Cape Palliser a W.N.W. course for 24 miles will take a vessel to the entrance of Port Nicholson, passing Taourakira and Baring Heads at the same distance. Barret Reef will then bear N. by E. four miles, and the entrance of the port will be open.

Palliser Bay is a deep indentation of the coast between Cape Palliser and Taourakira Head; its distance across is nearly eighteen miles, and its depth eight miles.

CAUTION.—This bay is perfectly open to southerly and south-east winds, and vessels should be very careful not to get embayed, as sudden shifts of wind to these quarters are not uncommon when it would be a dead lee-shore, with no shelter; there are from 10 to 14 fathoms within two miles of the beach, but the holding ground is bad, and a heavy sea soon gets up.

Taourakira Head, a bold headland, with the Rimutaka mountains extending from it in a north-easterly direction along the west side of Palliser Bay; the Hump, 3,400 feet high, is three miles from the head; and Mount Francis, 3,800 feet, lies over the north-west angle of the bay.

A low point extends from the head, giving it the appearance of the snout of a porpoise; but, approaching from the eastward, at a distance it appears to end in an abrupt convexity. Low detached straggling rocks extend off Taourakira Head, one-third of a mile, and continue almost the same distance from the coast as far as Baring Head; the Orong-orong river flows into the sea between these two heads.

Baring Head is nearly three miles W.N.W. from Taourakira Head, and is a flat table point, at the extremity of terrace land, extending towards Pencarrow Head; detached rocks above and below water extend from it about one-third of a mile. "A shoal, about one cable wide by three in length, with from 7 to 4½ fathoms on it at low water, running parallel with the shore, lies N. 53 W. 2½ cables from Baring Head; it breaks in heavy weather. To clear it keep Pencarrow light northward of N. by W. till Baring Head is one point open of Taourakira Head."—*Harbour Master.*

Fitzroy Bay and Anchorage.—Between Baring and Pencarrow Heads is a slight indentation of the coast only. "The best anchorage at the heads is one mile south of Barret reef, keeping the reef in a line. Fitzroy Bay has a foul bottom, and as the wind chops round to S.S.W. and South (not S.E. as stated in "Pilot") it puts vessels there on a lee shore. In the night anchor as nearly as may be on the line dividing the red and white lights of Somes Island light and Pencarrow light N.E. by E. in twelve fathoms."—*Harbour Master.*

PORT NICHOLSON (see Plan).

Pencarrow Head.—N.W. by N., three miles from Baring Head, is the eastern entrance point of Port Nicholson; it is a bold cliff, with a lighthouse on its summit. Low straggling rocks above water extend off the head nearly two cables.

LIGHT.—The light is *fixed white*, 420 feet above high water, and in ordinary weather visible 30 miles. From the lighthouse (an iron tower painted white) Baring Head bears S.E. by S. 3¼ miles, and Sinclair Head W. by S. ½ S. 6½ miles.

The western side of entrance to Port Nicholson is formed by a high peninsula almost separated from the main land by Evans Bay on the harbour

side and Lyall Bay to seaward, the low sandy neck separating these bays being scarcely half a mile across.

Approaching Port Nicholson from the southward or eastward this peninsula from a distance appears like an island, and in consequence Lyall Bay has frequently been mistaken by strangers for the true entrance.

Palmer Head, the south-eastern extreme of the peninsula just described, is the western entrance point of the port; the land over it is moderately high; it bears from Pencarrow Head W.N.W. one and a half miles, with a reef of rocks called the West ledge extending off it to the southward nearly three-quarters of a mile; these rocks are all above water, or awash, and may be approached with perfect safety within a quarter of a mile carrying 10 and 12 fathoms.

PILOT.—The pilot station is within the entrance, and pilots only board outside in moderate weather.

Between Palmer Head and Dorset Point, the next projection, distant one mile N.E. by N., stands the Barrel Beacon on an elevation of land.

Barret Reef, the chief impediment to the entrance of the harbour, is a cluster of rocks principally standing well out of water, lying nearly in the centre of the passage, and extending a little more than half a mile in a N. by W. and S. by E. direction, with an average width of about one cable. There are seven fathoms within half a cable of them; their southern extreme is a black rock ten feet out of water, which may be rounded within a cable in nine fathoms; there are two sunken rocks, one lying about 100 feet to the eastward, and the other about the same distance to the westward of the outer rock, the three lying in a nearly east and west direction; there are 12 feet on them at low water, deep all round; from the outer rock Pencarrow Light bears S.E. by E. $\frac{1}{2}$ E. one mile.

Chaffers Passage.—To the westward of Barret Reef is three cables wide, with a depth of from seven to ten fathoms, but being tortuous in its direction is only used by small vessels with a leading wind.*

The Main Channel, or that between Pencarrow Head and Barret Reef, is the broadest and usual passage, with a clear breadth of not less than six cables for a distance of $1\frac{1}{2}$ miles: that is, from the southern end of Barret Reef to abreast the Steeple Rock, on the western shore off the northern extremity of Dorset Point.

CAUTION.—All the points of the coast on the eastern side of the entrance have straggling rocks awash extending a cable off them; vessels working in should be cautious in approaching close to this shore, as in the event of missing stays they are in great danger from these out-lying rocks, and are liable to get into eddy tides.

From **Dorset Point** a reef similar in feature to Barret Reef extends to the south-east nearly three cables; from the northern end of the point another reef—of which the remarkable Steeple Rock is the extreme—extends to the north-east for two cables; off Steeple Rock one cable in a north-easterly direction, is a rock with nine feet on it at low water springs; the distance between the extremes of these two reefs is nearly three-quarters of a mile; vessels working up may stand on until in a line between them, having then 21 feet at low water.

Worser Bay is on the western shore, half a mile above the Steeple Rock, where a vessel may anchor if necessary in five fathoms, a quarter of a mile from the beach.

After passing Steeple Rock there is a clear working channel of more than a mile, with from 6 to 12 fathoms between the western shore and Ward Island; the points on the western shore may be approached within a cable.

Ward Island, a small yellow coloured cliffy island, lying on the eastern side of the channel, one mile off the eastern shore, $2\frac{1}{2}$ miles above Dorset Point, and $1\frac{1}{2}$ miles from the western shore, has shoal water extending from it to the south-westward nearly half a mile, at which distance the water suddenly shoals from 8 fathoms to 16, and in one spot 10 feet at the

* Chaffers Passage is not used even by steam coasters, as several sunken rocks are said to exist in it, the positions of which are not known.—Remarks by Nav. Lieut. J. E. Petley, H.M.S. "Dido," 1872.

Hope shoal. A *red* buoy is placed in 16 feet on its western edge. In working in the western side of Ward's Island should not be approached in daylight (for night time see below light on Somes Island) within a long half mile. With a leading wind, after passing the Steeple Rock and its outlying danger, steer to keep the western extreme of Somes Island a little on starboard bow, which leads well clear of the Hope Shoal. When the north end of Ward Island bears East the shoal will be passed. This part of the channel is reported to have shoaled to $5\frac{1}{2}$ and 6 fathoms. There is a passage between Ward Island and the eastern shore available for small vessels; the least depth of water is 10 feet. The main passage from Hope Shoal to the western shore is three-quarters of a mile wide, at Gordon Point, off which rocks extend, for one cable.

Halswell Point, the north extreme of the peninsula on the western shore, is three miles northward of Dorset Point. Rocks extend one cable off it, marked by a red buoy in $5\frac{1}{2}$ fathoms. On rounding it the town of Wellington will be opened out. Pipitea Point, a low sandy point (the north-west limit of Lambton Harbour), bearing west two miles.

Somes Island is clifty, 250 feet high, half a mile in length north and south, and quarter of a mile in width. It lies in about the centre of the port, opposite the entrance. Detached rocks extend a quarter of a mile off its north end; otherwise it may be approached within one cable, carrying seven fathoms. On its south point is a *white* iron lighthouse, 75 feet above the sea, shewing a *fixed* light as follows, viz.: *white* in midchannel, *red* on the western and *green* on the eastern shore of the main entrance. Strangers arriving off Pencarrow should be careful after bringing that light to bear E.N.E. to keep in the *white* light on Somes Island, ("especially when beating in on the eastern shore as the light cuts very fine on Pencarrow Point," *Harbour Master*), which should be seen ten miles off, or four miles without Pencarrow light, steering N. $\frac{1}{4}$ E. After passing the Pinnacle Rock within the entrance cross into the *red* light, and keep the port hand on board till the three *red* triangular lights at the end of the wharf are made out bearing W.S.W., when a course may be steered to the anchorage in Lambton Harbour, which is safe in any part, and with 20 feet $\frac{1}{4}$ of a mile from the breastwork at low water; outside that six to eight fathoms; inside the four fathoms line the water shoals rather suddenly.

Evans' Bay, between Halswell and Jerningham Points, runs $2\frac{1}{2}$ miles to the southward, is half a mile in width; deep water all over, and 20 feet at low water three cables from the beach at its head. A patent slip is constructed, and buoys laid down for swinging ships, in this bay. Off Jerningham Point, nearly one cable in a north-east direction, is a rocky patch with nine feet on it, marked by a black buoy in $5\frac{1}{2}$ fathoms.

Lambton Harbour.—After passing Halswell Point, a vessel may steer W. by S. for the Government House flagstaff (about two miles distant), anchoring in the harbour as convenient. (See above).

Pipitea Point must not be approached within a quarter of a mile, as a sand and shingle shoal with six feet water extends from it one and a half cables.

WATER.—The jetty abreast of Government House has been considerably lengthened, and water may be obtained from a pipe led under it. (See introduction for further remarks on harbour).

The **TIME-BALL** at the Custom-house is in lat. $41^{\circ} 17' 1''$ S., long. $174^{\circ} 49' 16''$ East, or, according to Capt. Nares, $174^{\circ} 46' 50''$. It is dropped every day but Sunday, at noon New Zealand meantime (to reduce which to Wellington time add 9min. 11.5secs.) or at 12h. 30m. 0sec. Greenwich meantime. The Surveyor-General gives the long. in time of the Survey Observatory as 11h. 39min. 9.92sec.

The extensive sheet of water in the northern part of Port Nicholson is free from dangers, with an average depth of from 10 to 15 fathoms.

Hutt River, in the N.E. head of the port, and two miles north-eastward of Somes Island, is navigable for large cargo boats about two miles to the bridge; the sandy beach may be approached within three cables in four fathoms water, within this the soundings are irregular.

SOUNDINGS.—The soundings in Port Nicholson have altered considerably since the last survey was made, but not sufficiently to interfere with the general navigation of the harbours.

"TIDES.—It is H. W. F. & C. at Barret's Reef at 4h. 40m., and at Wellington Wharf at 5h. 0m. The tides are very much influenced by the winds, and after much rain a considerable fresh from the Hutt River sets out of the harbour. Ordinary springs run $1\frac{1}{2}$ to $2\frac{1}{2}$ knots; neaps about one knot between Barret's Reef and the eastern shore."—Harbourmaster.

The flood stream outside the entrance sets to the northward and the ebb to the southward, and runs six hours each way.

It is high water by the shore at the southern entrance of Cook Strait at 6h. 0m.; but the flood or northerly stream commences at 3h. 0m., or three hours before, and runs until three hours after high water by the shore.

PREVAILING WINDS.—"Fresh N. to N.N.W. are the prevailing winds during the months from December to March and April, often accompanied by a clear sky and high barometer, but seldom lasting over forty-eight hours. S.S.W. to S.S.E. are the prevailing winds during the winter months, generally lasting from two to three days, with much rain. A rapidly falling barometer and a sultry atmosphere are almost sure indications of a shift of wind to the southward, particularly during the summer months, when the wind often shifts very suddenly, and blows fresh for a few hours and then gradually subsides. In winter the southerly gales often come in gradually with small rain, and last longer. As a rule there is less wind in the vicinity of Port Nicholson during the winter than the summer."—Harbourmaster.

Gales in Cook Strait.—Strong gales are so frequent in Cook Strait, and changes of wind from the north-west to south-east, and the contrary, are often so sudden that it seems desirable to offer a few remarks as to the most prudent course to be pursued by vessels under such circumstances both in entering Port Nicholson and in passing through the Strait.

Vessels arriving off the entrance of Port Nicholson with a moderate north-west wind may work in by day or night, provided the weather is sufficiently clear to see the dangers, which are all above water, excepting the rock with nine feet water on it, a cable north-east of Steeple Rock; but should the weather be thick, or the light on *Somes Island* not clearly distinguished, they ought not to attempt to enter at night, but stand off and on for daylight, or anchor according to circumstances outside Barret Reef. (See p. 92).

It frequently happens, however, that a strong north-west wind is met at the entrance, when most well-found vessels, with daylight, may work in against a double reef topsail breeze, but with a stronger wind few vessels would be able to work through the narrows; it then becomes a question whether to stand off under easy sail or to anchor outside. If a vessel can fetch in above *Pencarrow Head* she might anchor with advantage in 10 or 11 fathoms and ride out the gale, but the entrance should be *kept open*, as sudden shifts from north-west to south-east often occur, and vessels have found themselves awkwardly placed by anchoring under the lee of Barret Reef with a north-west wind.

With a south east wind, however strong, and clear weather, the port may be entered with perfect safety by following the directions already given. Under such circumstances a vessel should run in under easy sail, and anchor immediately six fathoms is obtained.

A vessel leaving Port Nicholson, bound to any of the ports on the eastern side of the North Island, north of the East Cape, and meeting a south-east gale before she is clear of Cook Strait, had better bear up and run to the north-west, making the passage round the north end of the island.

If bound southward, provided the weather be sufficiently clear to make the land, good shelter will be found in *Cloudy Bay* or *Port Underwood*, according to circumstances.*

* A steam vessel bound to Port Nicholson through Cook Strait and meeting a south-easter might make a good passage by anchoring first in *Current Basin*, from there steaming through *French Pass* and *Admiralty Bay* before the first of the southerly stream commences, enabling her to have the whole of that stream after rounding *Francis Head*; passing between the *Chetwode Islands* and *Harding Point*,

To a vessel entering Cook Strait from the westward and meeting a south-east gale, Port Gore or Guards' Bay offer good shelter if she is far enough advanced to fetch them. If not she may run for Port Hardy, or to the westward of D'Urville Island for Croisilles Harbour. With time and daylight permitting, this latter anchorage is to be preferred, for the heavy swell raised by the tides across the narrow entrance of Port Hardy renders it more a steamer's than a sailing vessel's harbour.

Coast Westward of Port Nicholson.—Three-quarters of a mile westward of Palmer Head is Lyall Bay. It is totally unfit for an anchorage, on account of the reefs which project off either point, and its exposure to the full force of southerly or south-east gales. A sunken rock, with 17 feet at low water, lies $1\frac{1}{2}$ cables E. by S. from the end of the reef running out from the western point of the bay.

Immediately westward of the head of Lyall bay is Mount Albert, 590 feet high, on which is a signal-staff, from whence the approach of vessels is telegraphed to the town. The telegraph cable crosses Cook Strait from Lyall Bay to Blenheim, on the Wairoa River.

Reef Islet lies three-quarters of a mile westward of Lyall Bay, surrounded by rocks, with a boat channel of 20 feet between it and the shore.

Sinclair Head, a high bold cliff, lies five miles W.S.W. from Palmer Head. Off it—and off all the intervening points—foul rocky ground extends nearly half a mile; the land increases in elevation to the westward; the Happy Valley Peaks, one mile to two miles inland of it, rise to a height of 1,700 feet.

From Sinclair Head the coast trends to the W.N.W. $6\frac{1}{2}$ miles to Cape Terawhiti; between these two headlands, $2\frac{1}{2}$ miles westward of the former, is Tongue Point, low and projecting, between which and Sinclair Head lie the following dangers to be avoided in approaching Port Nicholson from the westward:

KARORI, OR SEAL ROCK, high out of the water, bears from Tongue Point S. W. half a mile, and is not connected with it, although a reef runs off that point for a considerable distance.

TOMS ROCK, awash at low springs, lies E.S.E. one mile from the Karori Rock, and a quarter of a mile outside a line drawn from that rock to the extreme of the reef off Sinclair Head, being a short mile from the shore, and immediately off the Karori Stream.

CAUTION.—A rock has been reported lying S. $\frac{1}{2}$ W. two-thirds of a mile from Toms Rock; therefore Cape Terawhiti should be kept well open westward of Karori Rock, and Pencarrow Lighthouse open to the southward of Sinclair Head, when passing the coast between Cape Terawhiti and Sinclair Head. [“A half mile seaward is a bank with from 10 to 6 fathoms at low water springs, over which the tides set strongly, causing heavy riplings, like a shoal reef: the shallowest part is with Karori Stream N. $\frac{1}{4}$ E., and Karori Rock on with Cape Terawhiti.”—Harbourmaster.]

RIPPLINGS.—There are 10 and 12 fathoms a short distance outside the Karori and Toms Rock, but heavy tide riplings with irregular rocky bottom extend two and three miles off them, eastward of Sinclair Head these riplings cease.

“**LUNA ROCK**—a dangerous sunken rock with six feet water on it at low springs—is small in size, with deep water all round; lying $1\frac{3}{4}$ cables outside a line from Karori Rock to Terawhiti and half a mile from the nearest beach; it bears N. 57° W., five-sixths of a mile from Karori Rock.”—Harbourmaster.

Cape Terawhiti.—From Tongue Point the coast is bold and cliffy to Cape Terawhiti, which is a remarkable bold headland, rising immediately from the coast into an almost semicircular hill; its well-marked convex out-

steering close by Motu Ngara Island and Capes Lambert and Jackson. If after passing the latter cape there is a possibility of reaching Port Nicholson during that tide, she should stand over for the east shore of Cook Strait, as there the tide runs stronger. If there is no chance of saving the tide, she had better go up Queen Charlotte Sound for Tory Channel, anchoring, if necessary, in Oyster Bay, from thence she would easily reach Port Nicholson the next favourable tide.—Remarks y Navigating Lieutenant T. H. Tizard, H.M.S. *Challenger*, 1874.

line, as seen from the northward or southward, renders it difficult to be mistaken; it is also remarkable as being the salient point on this northern side of Cook Strait.

Directions for making Port Nicholson from the Westward.—Having described the dangers which exist immediately to the westward of Port Nicholson, remarks are added for making the port coming from that direction.

Between Cape Terawhiti and Wellington Head—W. $\frac{3}{4}$ N. 12 miles—is the narrowest part of the Straits. It is high water F. & C. here at 8h. 0m.; the flood or northerly stream commences at 4h. 0m. and runs until 10h. 0m., the strength of the tide varying from one to four knots.

Heavy tide rippings are experienced in the central part of the Strait between these two heads, where there is uneven bottom, the depths varying from 80 to 122 fathoms sand.

Running for Port Nicholson from the northward or westward with a fair wind, Cape Terawhiti should be passed at a distance of from two or three miles, and the continuous coast not approached nearer (taking care to avoid the Luna Rock, p. 96), until arrived between Karori Rock and Sinclair Head, when a vessel may haul gradually up towards the latter (taking care to keep Pencarrow Lighthouse well open, to avoid Toms Rock, and the one reported to exist outside it, p. 96), and passing about one mile from the points of land to the eastward of Sinclair Head, until Barret Reef opens out, when she may steer boldly for the southern end of the latter, passing it if necessary half a cable off as before described (being careful to avoid the sunken rocks on either side of it, see p. 93).

The course from the berth off Cape Terawhiti is S.E. by E. $\frac{1}{4}$ E. seven miles to abreast Sinclair Head, thence or when Palmer Head opens out (when a ship will be clear of the reported rock) N.E. by E. nearly the same distance to Barret Reef. During daylight all the outlying dangers can be seen except the Luna and Toms Rocks, and the rock reported to the southward of Toms Rock.

CAUTION.—The tide between Cape Terawhiti and Sinclair Head runs during springs five knots; hence, it is necessary, particularly with the flood stream, to give the coast a berth of two or three miles, as unless great attention is paid to the steerage, vessels are in danger of being set too close to the detached rocks. Eastward of Sinclair Head, and inside a line between it and Baring Head, the tides are not much felt, and generally there is an eddy with the flood, setting to the eastward along shore towards the entrance.

OVERFALLS exist six and seven miles S.W. of Sinclair Head; and the heavy rippings which occur during spring tides are highly dangerous to small coasters, especially at night, unless proper precautions are taken before entering them.

Coast Northward of Cape Terawhiti.—From Cape Terawhiti the coast turns abruptly to the N.N.E., and is a rugged cliffy shore fronted with straggling rocks; at one and a half miles off the soundings vary from 25 to 35 fathoms. Oharui Bight lies seven miles from the cape, and in moderate weather boats may land there, the distance by the road to the town of Wellington being only $3\frac{1}{2}$ miles.

Porirua Harbour (see Plan), 16 miles from Cape Terawhiti, and 2 miles eastward of Mana Island, is only available for small vessels; but in fine weather, and with off-shore winds, large vessels may anchor within the line of the outer heads.

Nearly in the centre of the entrance, half a mile northward of the south head, is a cluster of rocks, uncovered three feet at high water, abreast which on either side are $4\frac{1}{2}$ fathoms; within these rocks a bar of shoal water extends from north to south, having nine feet a cable inside the inner rock, and four feet a quarter of a mile within it.

The harbour runs to the S.E. one and a half miles from these rocks, and at the distance of one mile narrows to scarcely two cables; coasters drawing eight feet may enter at high water or three-quarters flood; when over the shoalest part, which is little more than half a mile above the centre rocks, and only a cable across, the water deepens to 15 feet, half a mile higher up

to 5, 6, and 7 fathoms; here the harbour branches off into two arms, one running to the eastward, and the other to the southward.

"The best channel is between the south head and the rocks, nearest the latter; when the reef off the north head opens eastward of the rocks, haul up to the S.E. for the entrance of the harbour, giving the main land to the south a fair berth as the shore is rocky; opposite side, sand. H.W., F. & C., 10h., rise about five feet."—Harbourmaster, Wellington.

The outer anchorage for large vessels is in the bay immediately within the north head; but if the wind should shift to the north-west, it is necessary to proceed for the anchorage under Mana Island or run for the strait.

Porirua Harbour by land is 12 miles from the town of Wellington, with an excellent road the whole way.

The flood or northerly stream begins in the offing at 5h. 0m., and the ebb or southerly at 11h. 0m.

Mana, or Table Island, is 13 miles N.N.E. of Cape Terawhiti. It is flat-topped, $1\frac{1}{2}$ miles long, half a mile wide, and 440 feet high. The northern and western sides are high and precipitous, with scattered rocks extending more than a cable off shore. On the eastern side the land is sloping. The south-east point is a shingle beach.

Mana island lies nearly $1\frac{1}{2}$ miles from the mainland, to which a bar called the Bridge extends from its south-east point, which may be crossed in 21 feet at low water, by keeping a quarter of a mile from the point of the island, with deep water in mid-channel. There is generally a heavy tide rippling on the Bridge, and the tides run from one to three knots.

ANCHORAGE.—Anchorage will be found under the south-east end of Mana, to the southward of the Bridge, sheltered from north-west winds, one-third of a mile off the island point in eight fathoms. "There is good anchorage under Mana Island on the south-east side during north-west gales in a small bight north of the Bridge. With southerly winds a small vessel may shift to leeward of the next shingle point to the north and ride safely; larger vessels may shift over to what is termed the Coalheaver, about $1\frac{1}{2}$ miles to the southward of Porirua harbour, and anchor in from five to eight fathoms water, with the centre of Kapiti in line with the north head of Porirua Bay."—Harbourmaster, Wellington.

The Coast Northward of Porirua Harbour for nearly three miles is high and cliffy, with straggling rocks extending off shore fully half a mile—Gibraltar, a high square rock standing close to the shore, with a reef outside it, being the northernmost; hence the coast trends with a slight curve and sandy beach northward for 11 miles to Waikanai, a native settlement on the bank of a small river, navigable for large boats at high water. There are from 10 to 14 fathoms one and a half miles off this part of the coast.

Kapiti Island, a prominent object entering Cook Strait from the westward, is five miles long, nearly parallel with the shore, and $1\frac{1}{2}$ miles wide; it rises in the centre to a height of 1,780 feet; the western shore is precipitous, but the eastern slopes more gradually towards the beach. Its south end bears from Mana Island N. $\frac{1}{2}$ E. 12 miles.

Long Point, its north-east extreme, bears N.W. $\frac{1}{2}$ N. three miles from Waikanai River, is a low rounding flat shingle point, extending nearly half a mile from the foot of the hills, with a small lake in the centre; close under this point there is shelter for a few small vessels from north-west winds, but they should not lie here with any sign of a south-easter; several coasters have been thrown on the beach and wrecked by doing so.

ENTRY ANCHORAGE (see Plan), at the south-eastern end of Kapiti, is formed by three small conical-shaped islets, which, together with the reefs extending off them, afford good shelter from south-east winds. The two southernmost islets, Hiko and Mahew, lie nearly one mile eastward of the south-east extreme of Kapiti, and within a cable of each other; a reef encircles them and extends more than a cable southward of Mahew, the outer islet. Between Hiko and Kapiti there is a channel a cable wide, with a depth of 15 feet.

Evans Islet, or the Sugar Loaf, lies little more than a mile to the N.E. of Hiko and Mahew Islets, and three-quarters of a mile from Kapiti, with

the Passage Rocks between, awash, with kelp round them; there is a passage for large vessels on either side of these rocks; that between Passage Rocks and Evans Islet is narrow. A reef of rocks above water extends from Evans Islet to the southward nearly four cables, with straggling rocks awash at low water off its extreme.

To enter the anchorage pass between the end of this reef and Mahew Islet, the breadth being nearly one mile: the depth of water within this is from 17 to 12 fathoms; anchor with the centre of Mahew Islet south, distant four cables, in 12 fathoms, sand and coral, a quarter of a mile from the shore of Kapiti; inside this the water shoals rather suddenly. "The anchorage is perfectly safe at all times to a properly appointed ship."—Harbourmaster, Wellington.

SOUNDINGS.—Between Kapiti and the mainland there is from 20 to 30 fathoms, clear of dangers, excepting the reefs which extend off the islets; one mile seaward of the island the soundings vary from 40 to 50 fathoms.

Coast Northward of Kapiti.—From Waikanai river the coast trends N. $\frac{1}{2}$ E., with an almost straight sandy beach for 28 miles to the Manawatu River, the Otaki and Oahau Rivers, navigable for large boats at high water, lying between, the former nine and the latter 15 miles from Waikanai; there are besides several small streams always fordable.

Sandhills from 20 to 40 feet high fringe the coast, and the mountain range, which is some six or seven miles inland at Wakanai, recedes eastward as it extends north.

Manawatu River may be known from the offing by a remarkable grove of trees on the north side, nearly three miles from the entrance; it is easier of access than any other river on this coast, the channel being straight; the depth varies after heavy gales or floods. "The channel is reported to have shifted northward this year. The wreck of the Kate Monaghan being in the centre of the channel inside the bar, where there is five feet at low water springs at shoalest part, masters of vessels are requested to pay particular attention to instructions of pilot as to which side of wreck to pass."—Notice to Mariners, N.Z.G. It is 250 yards across at the mouth, and a short distance inside becomes exceedingly tortuous in its course, intersecting the Ruahine range. "The pilot is stationed near the heads, on the north side of the entrance, and will board inward bound vessels inside the bar if wanted. There is three to four feet water on the bar at low water springs, rise six feet H. W. F. & C. 10h. Two moveable beacons—the seaward one *red*, and the landward one *black*, which can be seen two or three miles, are placed and kept in one lead over the bar. In moderate weather vessels may approach safely within signalling distance. A *white* light is shown on a flagstaff 45 feet above the sea, and visible all round seaward 9 to 11 miles. In addition to this light a *green* light is shown on the seaward, and a *red* light on the landward beacons, when the bar is possible. After getting inside it, and when the water deepens, keep the south spit well on board till the buoys are seen; then keep *red* buoys on starboard side, and *black* buoys on port; black and white beacons to be kept in one. In crossing the river from one side to the other by these directions, vessels will carry 10 to 12 feet at springs across the flats as far as the town (Foxton). The river is navigable for 30 miles."—Harbourmaster, Wellington.

Rangitiki River, the next river northward, is $9\frac{1}{2}$ miles from the Manawatu. ("Is navigable only for small vessels drawing four to five feet. A pilot-station with the usual signals is established here."—Harbourmaster, Wellington.)

From Rangitiki River the coast trends north-westerly towards Wanganui River, 24 miles distant, of the same character as that already described, a sandy beach skirted with low sandhills. The small rivers Wangahu and Turakini lie southward of Wanganui, the former five and the latter eight miles from it. They are about twenty yards wide at their mouths, and only navigable for boats, their bars being dry at low water.

Wanganui River bears from the north end of Kapiti Island N. by W. 52 miles. It lies in the depth of the great bight between Capes Terawhiti and Egmont, about an equal distance from both.

The best guide for the entrance is Tauperi (or the Devil's Thumb), a

remarkable sharp double-peaked hill, 1,860 feet high, about 18 miles inland, bearing N. by E. $\frac{3}{4}$ E., in a line with Ruapehu* Mountain. This leads directly for the entrance. When these mountains cannot be seen, the Seven Hummocks are a good guide to the river. These are a remarkable range of hillocks to the northward of Wanganui, eight miles from the coast, extending in an east and west direction for three miles, the easternmost one bearing from the entrance of the river N.W. by N. 12 miles.

The Land Guard, a remarkable bluff head about 100 feet high, on the south side of the river, two miles from the south entrance point, is also a prominent object.

The north head is a castellated cliff 70 feet high, with a flagstaff and pilot-station. The southern point is of low sandhills. A sandy beach extends two miles southward to the Land Guard.

LIGHT.—There is a white *fixed* light exhibited from the flagstaff on Castle Cliff (North Head) Wanganui, 65 feet above high water, which in clear weather should be seen 13 miles.

CAUTION.—Masters of vessels are warned that this is not a guiding light to clear any dangers, but is intended solely to enable them to keep their position off the port.

In fresh westerly winds the bar is one unbroken line of surf. There are eight fathoms in the offing one mile from the entrance, where vessels may anchor in fine weather. "The bar is from three-quarters to one mile from the entrance, and shifts considerably during the year, according to weather, etc. There is 11 to 14 feet water on the bar at high water springs, rise 6 to 7 feet springs, 3 to 5 feet neaps, H.W. F. & C. 10h. 15m. When inside the heads haul to the southward round the end of South Spit, and steer for Land Guard bluff, when the beacons on Training Walls will be seen. Keep red beacons on starboard, and black beacons on port side. A red light is shown on the lower ends of both Training Walls from sunset to sunrise. (In moderate weather, vessels can approach safely within signalling distance. In fine weather, the pilot will board inward-bound vessels when requested *by signal* to do so.) In fine weather, vessels having to wait for the tides can anchor in from four to eight fathoms from one to two miles off the bar.

SIGNALS.—Two shifting beacons—the inner one highest—are erected on the north head, and bear *red* flags by day and *red* lights by night, when the tide serves and the bar is safe, and are to be taken as guides in crossing the bar; when by day, the two beacons should be kept in one. Particular attention should be paid to the semaphore arms, on account of the curves in the channel inside the bar. Crossing the bar at night, keep the *red* lights of the beacons in one, and pay particular attention to the *green* light, which is used like the semaphore arm for guiding vessels inside the bar. It travels on a yard on the outer beacon, and vessels must be steered in the direction in which it is moved. Masters of vessels arriving off the bar at night should burn flash or blue lights, which will be answered by a torch or flare-up light from the pilot-station. Sailing vessels should not attempt to cross the bar at night, as the wind generally dies away or draws off the land.

"SIGNALS FOR VESSELS BOUND OUT WHEN OTHERS ARE OUTSIDE WAITING TO COME IN.

"Red flag, half-mast high—Bar is safe for sailing vessels outwards.

"White flag, half-mast high—Bar is not safe for sailing vessels outwards.

"FOR STEAMERS TOWING.

"Pendant, with red flag under, at mast-head—Bar is safe for towing.

"Pendant, with white flag under, at mast head—Bar is not safe for towing.

"SIGNALLING TO TOWN.

"White flag with blue square in centre, at yard-arm—Vessel on shore or on the bar.

"Pendant at mast-head—Steamers can cross the bar outwards.

"Two pendants at mast-head—Steamers cannot cross the bar outwards.—Harbourmaster."

* Ruapehu, an extinct volcano, is 9,195 feet high. Tongariro, an active volcano, is about seven miles to the northward of Ruapehu. From most points of view seaward they appear as one mountain.

“NIGHT SIGNALS FOR VESSELS IN THE RIVER BOUND OUT.

“Green light on bluff—Bar dangerous.

“Red light on bluff—Bar safe.—‘Nelson Almanac.’”

The coast is not dangerous. With the prevailing winds (north-west and south-east) an offing can always be gained. With westerly or south-westerly winds a vessel should not get embayed if there is any prospect of bad weather, but wait under Kapiti Island for an opportunity of entering the river.

The shore end of the second Cook's Strait cable from Whakapuaka is landed at Wanganui.

SOUNDINGS.—Between Kapiti Island and Wanganui River the water shoals gradually; there are from 40 to 50 fathoms 10 miles from the shore, until within 10 miles of the latter place, when it decreases to 30 fathoms, and shoals gradually to nine fathoms within one mile of the beach.

The flood tide runs in five hours, and the ebb out for seven. On the adjacent coast the flood runs to the northward and the ebb to the southward, from one to one and a half knots.

From Wanganui River the coast trends westerly towards CAPE EGMONT, distant from it 75 miles, and the features of the land become entirely changed; the sandy beach and low land extending the whole distance from Waikanai now give place to perpendicular cliffs from 80 to 100 feet high, composed of blue clay, which the sea washes at high water.

The only rivers navigable for boats along this whole extent of coast are the Waitotara, Wenuakura, and Patea, the former 16 miles and the two latter (within a mile of each other) 26 miles from Wanganui river. A harbour light is exhibited from a lighthouse erected on a cliff 70 feet high on the eastern side of the Patea river. The light is *fixed, red*, shows all round seaward, is about 133 feet above the sea level, and may be seen five or six miles.

Waitotara Point, a low sandy projection, is 14 miles westward of Wanganui, and two miles S.E. of the river of the same name. The clay cliffs commence again immediately to the westward of it, and continue to Waipipi, which is also a low sandy point, the last on the coast, and five miles south-eastward of Patea River.

Patea River.—“The flagstaff and pilot-station are on the cliff above mentioned, eastward of river. The bar has shifted very little since the harbor works have been in progress. There is now 10 to 13 feet on it at high-water springs, when it is H. W. F. & C. at 10h., rise from five to nine feet; the flood tide runs in 5h., and the ebb out 7h. The flood stream in offing sets north, and the ebb southward, one to two knots an hour. A rubble and concrete breakwater, 1,100 feet long and 20 feet wide, is being constructed, which keeps the bar and channel straight. A further extension of 900 feet seaward is in contemplation, as also a groin on the west side of the river to deepen and keep the bar clear, as well as to give more shelter to vessels crossing it. The prevailing winds are from west to north-west. The course in over the bar is N. N. E. There are good tides with northerly and poor ones with southerly winds. An iron beacon with a ball marks the end of the breakwater, and an iron beacon with a flag, low-water mark on the north spit. The width from the breakwater to the north spit is 139 feet; depth of water at end of breakwater 23 feet, and along it 17 feet. Vessels should keep the breakwater on board 20 to 30 feet until passing the second iron beacon on the east side, then sheer over to the port shore. Two shifting beacons—the inner one highest—are erected on a sandhill by the flagstaff, on which are shown when tide serves and bar is safe, by day—on outer beacon flag W, on inner flag M, the two to be kept in one when crossing the bar, paying particular attention to the pilot guiding. Steamers can cross the bar at night in moderate weather, when a *red* light is shown on the outer and a *white* light on the inner beacon, also a green light to guide.

“SIGNALS.

“Red flag, half-mast high—Bar safe for sailing-vessels outwards.

“Pendant with red flag under at mast-head—Bar is safe for toving.

“Pendant at mast-head—Steamers can cross the bar outward.

“Two pendants at mast-head—Steamers cannot cross the bar outwards.

"In moderate weather, vessels can approach safely within signalling distance, and can anchor with the flagstaff N. by W. or the lighthouse N.N.W. in six and seven fathoms. A good buoy rope is necessary, as the ground is foul in places. Freshes in the river mostly occur from June to August, and clear the river out thoroughly, but do no damage to shipping. Sailing vessels cannot enter in a heavy fresh without a strong fair wind. The trade of Patea has increased considerably, as many as 39 vessels having crossed the bar in one month. The port is best suited for vessels drawing five to eight feet, but those drawing nine and ten feet can enter at springs. There are two wharves on the west side, which can discharge 60 to 80 tons a day, and others are in course of construction. The river from bar to bridge has an average depth of 15 feet."—Harbourmaster.

From hence the coast recedes gradually round Waimate Bight, 23 miles, affording no shelter, the coast being an unbroken line of cliffs averaging one hundred feet high.

Five miles westward of the Waimate Pah is the Kaipokonui, a rapid stream in the summer floods, when it is dangerous to cross; it is not navigable even for canoes at the entrance.

About seven miles north-west of Kaipokonui stream is Otumutua point, five miles north-west of this point is Opunake Bay.

Opunake Bay.—This anchorage is only fitting for steamers and small sailing vessels. Opunake Bay is of horse-shoe shape and about one-third of a mile deep, with high cliffs round the shore. The north-west head extends 200 yards seaward of south-east head. The bay is sheltered from winds between south-east round by east, to north-west.

LANDING.—The accommodation for landing and shipping at present consists of one cargo boat capable of carrying two tons in moderate weather, worked by the constabulary when required. The boat is worked in the same way as at New Plymouth, with a rope attached to the warping buoy. Small vessels can beach in fine settled weather, when the beach is remarkably smooth.

REEFS.—A reef extends from the north-west head half a mile in a southerly and south-westerly direction; there is also a reef off the south-east head in a south-westerly and westerly direction about one-third of a mile. These reefs shelter the bay at low water in bad weather, breaking the sea before it reaches the beach.

The channel in to Opunake bay is one third of a mile wide between these reefs, with a depth of 8 to 4 fathoms at low water. The distance from head to head at low water is about one third of a mile.

There is a sandy beach in the centre of the bay, about 250 yards long. Detached rocks lie under water about half a cable from low-water mark, and nearly $1\frac{1}{2}$ cables from the north-west shore, with four feet on them at low water; they are well out of the way of the anchorage.

BEACONS.—Two *black* beacons are erected on the north-west side of the bay to mark the best anchorage; the upper beacon is 20 feet and the lower 10 feet high, they are 380 feet apart, and bear from each other N.W. $\frac{1}{4}$ W. and S.E. $\frac{1}{4}$ E. When they are in line, a vessel is sufficiently close in to have room to swing. A *white* beacon 10 feet high, placed 96 feet S.S.W. $\frac{3}{4}$ W. from the flagstaff (at the head of the bay) is intended as a leading mark into the bay.

DIRECTIONS.—A vessel bound for Opunake should keep about two miles off shore until the flagstaff bears N.N.E. $\frac{3}{4}$ E. then steer in on that bearing until the *white* beacon in front of the flagstaff is seen; keep this beacon and flagstaff in line, bearing N.N.E. $\frac{3}{4}$ E. until the two *black* beacons on the port hand are in line bearing N.W. $\frac{1}{4}$ W.; then anchor in 4 fathoms stony bottom; should the wind be strong from south-east or north-west, keep a little to windward, where will be found the smoothest water, with nearly a cable swinging room. Sailing vessels of 50 tons or upwards should anchor about three-quarters of a mile off the heads in 10 fathoms rocky bottom, on the following bearings: Otumutua point S.E. by E. $\frac{1}{2}$ E., and the flagstaff N.N.E. $\frac{1}{2}$ E.; and be prepared on the first appearance of strong on-shore winds to proceed to sea.

It is H. W. F. & C., at Opunake, at 9h. 45m.; range of tide 7 to 10 feet, length of beach between high and low water, springs, 750 feet.

SIGNALS.—The following signals are used at Opunake :

Stand in with safety.—Four balls horizontal on yard, two on each side of mast.

Anchorage in the bay unsafe, but vessel can anchor outside and a boat will be sent off.—Three balls horizontal on yard, two on one side of mast, one on the other.

Bay dangerous, keep to sea.—Two balls horizontal on yard, on either side of mast.

NIGHT SIGNALS.—White light over red.—Wait till daylight; anchorage safe.

Red light over white.—Bay dangerous; keep off.

From Opunake the coast trends first north-westerly, then northerly and easterly to New Plymouth (*Taranaki*), its westernmost projection being Cape Egmont.

Nine miles southward of Cape Egmont the cliffs terminate, and the coast thence to the Sugar Loaf of New Plymouth is low and rocky, with sandy or shingle beaches. Cape Egmont itself has no distinguishing feature, being a slight projection from the general curve; it bears from the summit of the mountain W. by S. distant 15 miles. It is proposed to erect a lighthouse on Cape Egmont, and the Marine Department in their Report dated 3rd August, 1880, recommend that it be proceeded with at once. $3\frac{1}{2}$ miles south of the cape is Harriet Bay, a sandy beach two miles in extent, about the only spot on the coast where a vessel could be beached, as from all other parts rocky ledges extend for some distance from the shore.

Mount Egmont, standing alone as it does, is the most strikingly remarkable mountain in New Zealand, and may be seen from a vessel's deck in clear weather from a distance of over a hundred miles. It rises in a perfect cone from a base of thirty miles in diameter to a height of 8,270 feet above the sea, and presents nearly the same appearance from every point; its summit, an extinct crater, is flattened, and covered with perpetual snow for nearly a quarter of its entire elevation. A saddle-shaped eminence rises to the north-west of the mountain to a height of 4,600 feet, and in the same direction, three miles from the coast, is a similar range, but much lower.

SOUNDINGS.—The approaches to the coast between Wanganni River and New Plymouth have not as yet been thoroughly sounded; but parallel with and 15 miles off shore, there are from 35 to 45 fathoms, dark sand; when Mount Egmont bears N.N.E. the water deepens, and abreast it, at the distance of nine miles, there are 57 fathoms, mud; northward of the cape there are 35 and 38 fathoms, sand and stones, $2\frac{1}{2}$ miles from the shore.

CAUTION.—Vessels rounding this cape are recommended to give it a berth of five miles, as outlying shoal spots are reported to exist.

New Plymouth Roadstead (see Plan on Sheet Chart) is nearly 20 miles north-eastward of Cape Egmont; is well marked from seaward by the Sugar Loaf Islands and the remarkable dome-shaped hill Paretutu, or main Sugar Loaf, also by its proximity to Mount Egmont.

The coast for 15 miles eastward of this anchorage is fringed with reefs, extending three-quarters of a mile from the shore; Puke-tapu Reef, seven miles to the eastward, extends fully one mile.

The settlement flagstaff is immediately above the landing-place; from it Mount Egmont bears S. by E. $\frac{1}{4}$ E. 14.45 miles, and Motu-roa, the highest of the Sugar Loaf Islands W. $\frac{1}{4}$ S. 2.05 miles.

The roadstead extends from the Sugar Loaf Islands to a line north of the flagstaff; at an average distance of $1\frac{1}{4}$ miles from the shore there is an uniform depth of from 10 to 12 fathoms; it is, however, not prudent for vessels of any size beyond coasting craft to come within this depth, as the bottom becomes very foul; a reef, covered in places with large boulders, lies two cables westward of the inner anchorage, extending three-quarters of a mile to the westward, and about the same distance off shore; its eastern edge lies N.N.W., and its north extreme N.W. $\frac{1}{2}$ N. from the flagstaff, and N.E. by E. $\frac{3}{4}$ E. from Motu-roa. The reef and ledge break in moderate weather, and shelter the landing-place from the prevalent south-west winds

105th E

and swell. Care should be taken in leaving the anchorage not to bring the flagstaff to the eastward of S.S.E. till the outer Sugar Loaf bears W.S.W., when a vessel will be outside it.

ANCHORAGE.—The best anchorage is in 12 fathoms at low water, with the Wesleyan Mission School, a remarkable building on elevated ground midway between the town and Sugar Loaf Islands, in a line with Mount Egmont bearing S. by E. $\frac{3}{4}$ E.; and the Seal Rock midway between the two large Sugar Loaf Islands, bearing S.W. $\frac{1}{2}$ S. The flagstaff will then bear S.E. by E. $\frac{1}{2}$ E. distant $1\frac{1}{4}$ miles.

The anchorage now used by trading vessels of all classes extends along a line bearing N. $\frac{1}{2}$ W. from the flagstaff on Mount Elliott (a slight elevation behind the boat-sheds). Large vessels anchor from 1 to $1\frac{1}{4}$ miles from the shore in eight to nine fathoms, sand and rocks, the flagstaff bearing S. $\frac{1}{2}$ E.

LIGHT.—A white fixed light, 75 feet above the sea, is shown from the flagstaff.

The roadstead is open to all winds from south-west round by north to E.N.E. (eighteen points of the compass.)

DIRECTIONS.—A vessel from the westward bound for New Plymouth should make the outer Sugar Loaf Island, and when it bears south one mile distant steer E.S.E. until the same island bears W.S.W. Keep it on that bearing until the small white flagstaff on the beach (in front of the boat-sheds) comes on with the flagstaff on Mount Elliott S. $\frac{1}{2}$ E.; the vessel will then be in a good berth for anchoring. A vessel from the northward, with a fair wind, may run for the flagstaff on Mount Elliott when bearing S. $\frac{1}{2}$ E., continuing on this course until the outer Sugar Loaf bears W.S.W., which will bring her near the above berth.

CAUTION.—If working to windward from north or north-east with S.W. winds, do not approach the coast eastward of the anchorage nearer than the depth of seven fathoms, to avoid the reefs before described.

The general nature of the bottom appears to be rocky ledges, covered with a thin coating of dark-coloured sand; but north of the settlement it is strewn with large boulders and shingle. Vessels often experience a difficulty in weighing, caused by the foul ground below the sand. A stout crown rope to ensure canting the anchor should always be employed, with a cask or nun buoy. There is at all times a swell in the roads, and a vessel should leave with the first symptom of an on-shore wind, and therefore be prepared to slip; it is better to use chain for the slip buoy, as the foul ground would be likely to cut rope. If obliged to slip, and the wind is N.N.W. or eastward of that point, fill on the starboard tack, but if to the westward of N.N.W. slip on the port tack, and carry as much sail as the vessel will bear.

It is necessary to ensure casting the right way.

WIND.—Should the wind veer to north-west from south-west, through west, it may be looked on as certain that a strong onshore wind will set in within 24 hours, however fine the weather may be when the change takes place.

In the event of having being obliged to slip, masters of vessels can obtain information of the state of the anchorage by closing the outer Sugar Loaf, when the Harbour Master will inform them by signal what to do, vessels having often kept to sea in a strong south-west wind when there has been good working weather in the anchorage.

Sugar Loaf Islands (*Nga-motu*) are an appropriately named group; the highest (*Paretutu*) rises from a low point of the adjacent mainland as a sharp cone to an elevation of 503 feet. The inner islet (*Motu-roa*) is similar in character and 266 feet high, whilst the outer (*Motu-mahanga*) is saddle-backed with a conical summit 190 feet high.

Anchorage will be found in south-west winds under the inner Sugar Loaf Island (*Motu-roa*) on the following bearings; Pare-tutu in line with Miho Tahī (a small rocky hill of the Sugar Loaf group which is an island at high water), S.W. by S.; the centre of Motu Mahanga on with north extreme of Motu-roa West in five fathoms water.

There is a deep passage between these islands, avoiding Barret reef, a half-tide rock, lying half a mile westward of Motu-roa, and passing on

either hand of the Seal Rocks, a cluster of some extent, the highest part having 35 feet elevation.

WINDS AND WEATHER.—During the summer months (November to February) there are generally regular land and sea breezes, the latter from south-west, and light winds off the land during the night.

In the winter season the weather is variable, but the spring and fall of the year bring the strongest gales. South-west or W.S.W. is the prevailing quarter; these winds throw a heavy swell round the Sugar Loaf Islands into the anchorage. South-east is the fine weather quarter, and with this wind Mount Egmont is usually clear. North-west winds, which blow directly on shore, seldom blow home, and are generally preceded by a swell from that direction; they do not come on suddenly, but back round from north-east and north.

ROADSTEAD IN NORTH-WEST GALES.—In the event of a vessel being compelled to leave the roadstead by the approach of a north-west gale, she may run for Massacre Bay, the nearest anchorage, which affords good shelter from north-west winds.

North-west winds are generally clear, and a vessel might make the high land of Separation Point, without fearing Entry Point and the spit off Cape Farewell, by a good look-out and bearings of the land and light; it must be remembered, however, that the inner side of this long sand spit is very steep-to.

SIGNALS.—In addition to the general harbour signals (page 39), the following night signals are used at New Plymouth:—

FROM THE SHORE.

Two *red* lights vertical—A boat will come off.

FROM THE VESSEL.

Two white lights horizontal with one *red* over, forming a triangle—A pilot wanted.

The two lights on the shore will appear vertical when a vessel is in the line of anchorage, the flagstaff bearing S. $\frac{1}{2}$ E., the lowest light most seaward. The following additional information is furnished by the Harbour Master, Cape Holford, viz. :—

"TIDES.—It is H.W. F. and C. at 9h. 30m., rise 7 to 12 feet. The flood sets to the westward, the ebb to the eastward, about one knot, much influenced by the winds. In the offing strong currents are experienced, also influenced by the winds; after south-west gales a north-east current along the land has been found fully $1\frac{1}{2}$ knots.

"Landing arrangements are very perfect, and performed with much expedition, 80 to 100 tons per day are landed with the greatest safety. The boats are hove up on dry ground by a steam winch, and rapidly discharged into carts. The Harbour Master considers that boats may be launched six days out of seven on an average.

"ANCHORAGE—in seven fathoms about one mile from the shore. A small set of moorings for sailing vessels of 100 tons and under are laid down a quarter of a mile inshore of above anchorage, in six fathoms low water springs, marked by a black buoy. The anchorage for steamers is fully quarter of a mile inshore again, and somewhat under half a mile from high water mark.

"REEFS.—A reef extends $\frac{1}{2}$ of a mile off shore, at about two cables to the eastward of the inner anchorage; but as this anchorage is only used by steamers and small vessels there is ample room to get under weigh. A shoal patch of rocks, with 17 feet over them at low water springs, about 30 feet square, with four fathoms close to, lies nearly in the centre of the inner anchorage. Two white beacons on the western shore in line marks the centre of the patch; they should therefore be kept open. A vessel running for the anchorage with strong south-west winds should shorten sail in good time, so as to carry no more than is necessary to keep her under command when coming to, when cable should be veered, without checking, to 60 fathoms, to lessen risk of dragging. Vessels trading to this port should be provided with ground tackle of the very best quality, both anchors and chains, not less in weight and size than those prescribed in Lloyd's rules; as their safety may depend on the quality of their ground tackle. No vessel, however small, should have less than 60 fathoms of chain out. If lying at

the inner anchorage, a vessel would have to work to windward to clear the reefs unless it should be high water. N.B.—A maul, cold chisel, and punch should always be kept ready.

“SIGNALS.—In addition to the general signals for the colony (p. 39) the following ‘local’ signals are used as required :—

“ FROM THE SHORE.

“ A ball at one yard-arm, and one on mast, half the length of the yard, below the yard—Wait till ebb tide.

“ A ball at each yard-arm—You may stand in safely.

“ Two balls at each yard-arm, one below the other—You may stand in safely, a boat will put off.

“ Two balls at one yard-arm (one below the other), and one ball at the other yard-arm—Keep to sea (to vessels approaching).

“ Two balls horizontal on yard, on either side of mast—Put to sea.

“ No. 2 Marryatt's (letter J, commercial code) over the 2nd distinguishing pendant, (letter D, commercial code) at mast head—You are running into danger.

“ Signals to shipping by night will be as published in the ‘New Zealand Harbour Regulations’ (p. 39), but when it is intended that vessels at anchor should put to sea, two guns will be fired, in addition to showing the proper lights. If the vessel (or vessels) thus signalled can put to sea, she (or they) should repeat the proper signal (two white lights horizontal with a red light between) to show that the order has been understood and will be obeyed. If any vessel cannot put to sea, from whatever cause, let her show the proper reply (cannot put to sea—two white lights horizontal with a green light between them). Vessels approaching New Plymouth at night requiring a pilot, and wanting to come in before daylight, should fire a gun and burn blue lights, if possible, to secure attention. The ordinary signal, wait for daylight, white over red, will be kept up when vessels are expected, or are seen approaching New Plymouth and Waitara.”

The projected artificial harbour or breakwater at the Sugar Loaves has been mentioned previously (p. 34).

COOK STRAIT—(*Continued*).

VARIATION IN 1875.

Cape Campbell - - 15° 20' E. | Cape Farewell - - 15° 10' E.

FROM CAPE CAMPBELL TO CAPE FAREWELL, INCLUDING
BLIND AND MASSACRE BAYS.

Cape Campbell, the north-east extreme of the South Island of New Zealand, forms the south-western entrance point to Cook Strait. It bears from Cape Palliser W.S.W., distant 44 miles.

The cape is a low salient point with a sandy entreme, and should be approached with caution, especially at night and in thick weather. From the northward two steep-peaked cliffs of a yellowish colour, with a rounded summit (Mount Tako), aid to point out its position. Mount Tako is 674 feet high, and lies $1\frac{1}{2}$ miles to the south-west of the low extreme of the cape. An encircling dangerous reef of sunken rocks, with some detached and above water, extends nearly a mile N.N.E. of the cape extreme, and continues $1\frac{1}{2}$ miles southward on the seaward face of the cape, fully half a mile from the land, outside of which, and three-quarters of a mile to the north-eastward of the cape extreme, is a detached reef, Bowler's Reef.

LIGHT.—The light on Cape Campbell is a *revolving* white light, attaining its greatest brilliancy *every minute*, elevated 155 feet above high water, and in clear weather should be seen from a distance of 19 miles all round seaward between the bearings of N. $\frac{1}{4}$ W. and E. by N. $\frac{1}{2}$ N. The tower, situated on a knoll at the extremity of the cape, is 73 feet high, and painted with alternate bands of red and white. Vessels from the south bound to Wellington should take a good departure from this cape, avoiding the above-mentioned reefs, as the tides are strong in the straits.

SOUNDINGS.—The depth of water in the centre of the strait between Capes Campbell and Palliser is 100 fathoms dark sand, decreasing gradually

towards either shore. Advancing in the strait to a position midway between Cape Campbell and Taourakira Head, the depth increases to 250 fathoms. This appears to be a deep hole about five miles in extent, and has generally a heavy tide rippling over it. It must be observed that wherever these rippings are experienced the water is generally very deep, with an irregular bottom.

Clifford Bay.—From Cape Campbell to the westward for a distance of two miles the coast, which is fringed with rocks, forms a bight, and affords a fair anchorage in seven or eight fathoms about one mile off shore with southerly winds. Eleven and a half miles north-westward from Cape Campbell is White Bluff, the coast of the bay between being low, with a shingle beach. The Lake Kaiparatahan is four miles from the cape, and just within the beach. Two small rivers empty themselves into the bay northward of it. The northernmost, Awatere River, three miles south of the White bluff, is a considerable stream, having five feet on its bar at high water.

White Bluff is a remarkable range of steep white-faced cliffs, 890 feet high, rising boldly from the sea. A mountain range extends from these cliffs to the W.S.W.

Cloudy Bay is a deep indentation with a shingle beach between the White Bluff and Port Underwood, a distance of 12 miles, with 12 fathoms across the entrance, and 9 fathoms $1\frac{1}{2}$ miles from the beach, decreasing gradually to the shore. There is good shelter at its head, with all off-shore winds from north round to south-east, out of the strength of the tide, with the advantage of Port Underwood being open in case of the wind drawing more to the eastward.

Wairau River falls into Cloudy Bay, $5\frac{1}{2}$ miles from the White Bluff and eight miles from Port Underwood. In moderate weather, cargoes can be conveyed by it from the plains and shipped in Cloudy Bay.

The river is navigable for cargo-boats six miles from its mouth. At high water there is six feet on the bar. A signal-staff is erected on the western entrance-point, where a flag is hoisted when boats or small vessels can enter, and lowered half-mast when the bar is impassable. Vessels may anchor one mile off the entrance in five fathoms. "The river is navigable for vessels drawing not over five feet. There is eight feet on the bar at high water. Two beacons in line, with casks on top—one *white*, the other *red*—are the leading marks in over the bar. The pilot attends at the heads at tide time, and guides vessels in by waving a red flag in the direction the vessel is to steer."—Wellington Almanac.

A *fixed* white light, 38 feet above the sea level, visible 11 miles, is shown on flagstaff on west side of the entrance.

It is H. W. F. & C. at Wairau River at 6h. 0m., and the stream runs in one hour after. Ordinary springs rise four feet, but with south-easterly winds five or six feet. The greatest rate of tide at the entrance is $3\frac{1}{2}$ knots. The shore end of the telegraph cable across the Straits from Lyall's Bay is landed in White's Bay, southward of Disaster Point, at the northern end of Cloudy Bay.

Port Underwood is a good and spacious harbour, accessible in all weathers, and a frequent port of refuge for vessels unable to enter Port Nicholson or to pass through Cook Strait. It lies at the north end of Cloudy Bay, and is 32 miles W. by S. $\frac{1}{4}$ S. from the entrance of Port Nicholson. Its head is within $1\frac{1}{2}$ miles of the western part of Tory Channel. The land in the immediate neighbourhood is mountainous, Mount Robertson rising over its western side to a height of 3,283 feet, and the Treble Mountain adjoining it 2,930 feet.

The entrance between the mainland and Robertson Point is well marked. A distinct saddle hill rises half a mile east of the point, and the coast suddenly drops between the hill and the higher land to the eastward. Robertson Point has straggling rocks out of water and awash off it, and should not be approached within two cables. Two cables S.S.E. of the north point of Robin Hood Bay—the western entrance point—is a detached rock above water. These are the only dangers. The width at the entrance is one mile, and within, the average depth is nine fathoms.

The harbour runs nearly north and south four miles, and in its upper part is divided into two arms by Separation Point, a high and narrow peninsula two miles long. The western arm is named Minna and the eastern Brenda Bay, each forming a separate and well-sheltered harbour.

ANCHORAGE.—There are several snug bays on either side of the port. Bell's Cove, on the eastern shore, one mile above Robertson Point, is a convenient anchorage. It is about four cables broad, and half a mile in depth, with seven fathoms all over. Off its northern point, connected by a ledge, is Turner Island, whose outer extreme is distant from the point three cables, with a reef covered with kelp extending from it more than a cable. The several bays above Bell's Cove also afford excellent anchorage.

The first cove on the western side of the port is Ocean Bay, nearly abreast Robertson Point. It has $4\frac{1}{2}$ fathoms within the points. Two miles above it, on the west side of Minna Bay, and abreast Separation Point, is Oyster Cove, a snug anchorage with six fathoms.

The Coast from Robertson Point trends N.E. by N. towards Tory Channel and Wellington Head, the latter distant from it 15 miles, and is rugged and cliffy, broken into small bays, with rocks extending off the points, some nearly half a mile, and many covered at low water.

CAUTION.—A vessel should not approach this coast nearer than one mile, at which distance 40 fathoms will be found five miles from Port Underwood.

Wellington Head is a bold and prominent headland. Its sea face is a steep and rugged cliff, with a high rock standing close off it to the southward. The summit immediately over the head rises 2,190 feet above the sea.

Tory Channel.—Two miles south-westward of Wellington Head is the eastern entrance to Tory Channel (leading to Queen Charlotte Sound), its northern side being formed by Alapawa Island, which separates it from the Sound. This channel is used with advantage by coasting vessels and the steamers which call regularly at Picton. The entrance between the east and west heads is only a quarter of a mile wide, and the tide during springs attains a rate of five knots. Two peaked rocks extend to the south-east from East Head, and there are also some rocks above water lying a short distance off West Head.

The channel, seven miles in length to its junction with Queen Charlotte Sound, maintains an average width of about half a mile, the depth being from 25 to 35 fathoms. There are several coves on either side with good anchorage in six to nine fathoms. They generally shoal suddenly within their points, with the bottom composed of such soft mud that a vessel might ground without feeling it, unless the lead is kept going.

The first cove, three-quarters of a mile within the entrance on the north side, is rather exposed for an anchorage. The next, nearly a mile above it, is Jackson's Bay, divided into two portions by the White Rocks, which extend off its middle point (the northern portion is Barret Bay), with good anchorage in seven fathoms, but not inside the outer extreme of the White Rocks.

Oyster Harbour, on the south side, $3\frac{1}{2}$ miles from the eastern entrance, is the best anchorage in the channel. Vessels may anchor in six fathoms well within it, perfectly sheltered and out of the tide. Three bays succeed Oyster Harbour to the westward—Arrowsmith, Dacre, and Pelham Bays. On the north side of the channel Henderson Bay is immediately opposite Arrowsmith Bay.

The western entrance of Tory Channel turns in a north and south direction; more than half a mile wide, with 30 fathoms water, and entirely free from dangers. Dieffenbach Point, the western point, is a flat cliff extreme, rising gradually to a bare yellow summit, 1,200 feet high. Some sunken rocks lie half a cable off it, so that it should not be approached within a cable. Heaphy Point is the eastern point.

Vessels of any size may run through the Tory Channel with a fair wind, by taking advantage of the tide; but it is not recommended for a large vessel to work through, the channel being so liable to squalls and baffling winds off the high land. The tides, moreover, are strong, and the water is inconveniently deep to drop an anchor, if it should be necessary.

DIRECTIONS.—Vessels crossing Cook Strait from Port Nicholson should steer for the second peaked hill southward of Wellington Head. On a nearer approach the land southward of the entrance of Tory Channel will be easily distinguished by its chalky cliff-like appearance, gradually sloping down to the west head, which is steep, and terminates in a small rocky islet 50 feet high. The land on the north side is higher and less steep. “Steamers or handy vessels from Wellington to Picton will save time by using the Tory Channel. Entering with the flood tide, keep about mid-channel. If against the ebb, keep over towards the southern shore, as thereby you avoid the tide, until abreast of Boat Harbour Rock, which is awash, and less than half a cable’s length from the shore. After passing this rock you will get the full force of the tide on the port bow, unless a sweep is made so as to meet it end on. After passing the rock there are no other dangers at a greater distance than 10 fathoms from the shore, etc.”—“Wellington Almanac.”

Cape Koamoroo, the north entrance of Alapawa Island, and the southern entrance point of Queen Charlotte Sound, bears N. $\frac{3}{4}$ W. $6\frac{1}{2}$ miles from Wellington Head. Between them the coast is nearly straight, very steep, and ironbound. About midway the island is nearly divided by the waters of East Bay, on the western side of the island.

DANGERS OFF COAST.—Off this part of the coast lie the principal dangers in Cook Strait, namely, two rocks awash north-eastward of Wellington Head; the Brothers Islands, with their reefs, and Cook Rock.

AWASH ROCKS.—The two rocks awash occupy a space of one-third of a mile, in a north and south direction; the southern rock is nearly awash at high water, and the northern rock dries six feet at low water; they lie N.E. by N. $3\frac{1}{2}$ miles from Wellington Head, S. by E. $\frac{1}{2}$ E. two miles from the South Brother, and $2\frac{1}{2}$ miles from the nearest part of the coast, with 48 fathoms in mid-channel between. The Brothers’ light N.N.W. clears half a mile to the eastward.

Brothers Islands, two small islands, each nearly one-third of a mile in length, and about 235 feet high, nearly one mile apart in a N. by E. and S. by W. direction; the northern islet bears E. $2\frac{1}{2}$ miles from Cape Koamoroo, and the south one from Wellington Head N. by E. $\frac{1}{4}$ E. five miles.

There is no passage between these islands; several rocks and reefs are scattered about them, and the tides are very strong with heavy rippings; “a reef extends half a mile to the east of the South Brother”—*Chart*; a rock with about three feet on it at low water lies W. by S. $\frac{1}{4}$ S. from the centre of the south island a long half a mile, which narrows the passage between the Brothers and the land of Cape Koamoroo to little more than one mile; although there is deep water (56 fathoms), this passage is not recommended, and certainly vessels should never take it without a fair wind; the Brothers Islands should not be approached within one mile by a stranger.

LIGHT.—A *white light flashing* every ten seconds, 258 feet above the sea, on a white tower 28 feet high, visible 22 miles, is shewn on the Northern Brother, and from the lower part of the lighthouse a *fixed red light* is shewn over Cook Rock (see *Chart Cook Straits*), with an arc of 5° , shewing 300 yards on each side of the rock, and in a fainter degree for another 100 yards.

Cook Rock is highly dangerous, as it is only awash at low water springs, and is in the track of vessels passing through Cook Strait from the westward, and also of those entering Queen Charlotte Sound. It lies N.W. by N. $\frac{3}{4}$ N. $3\frac{3}{4}$ miles from the Northern Brother, the red light on which marks the rock, and should not be entered on when in its vicinity; N. by E. $\frac{1}{4}$ E., $3\frac{1}{2}$ miles from Cape Koamoroo; and from Cape Jackson, the northern entrance point of the Sound E. by S. $\frac{1}{4}$ S., distant $5\frac{3}{4}$ miles; there is generally a tide rippling on and about Cook Rock, and in strong winds it will be seen to break before low water—when visible it resembles a whale’s back.*

CLEARING MARKS.—To clear Cook Rock vessels entering Cook Strait from the westward and bound through, or to Port Nicholson, should, when

* Capt. Fairchild says: “Cook Rock is steep to on the N.W. side, but to the S.E. five fathoms will be found 300 feet, and 15 fathoms, 600 feet from it; it dries two feet low water, and has a steep top.”

abreast of Stephens Island, and three or four miles from it, steer S.E. by E. for 30 miles, or until the Brothers are in a line with Wellington Head bearing S. by W. $\frac{1}{2}$ W., or at night when the light comes westward of this bearing; Cape Terawiti will then bear S.S.E. (according to the "N.Z. Pilot," but query, S.S.E. $\frac{1}{2}$ E. by Chart); and Cook Rock will be in a line with the White Rocks and the north end of Long Island (in the entrance of Queen Charlotte Sound), bearing S.W. $\frac{3}{4}$ S. distant $5\frac{1}{2}$ miles; a course may then be steered S. by E. (by "N.Z. Pilot," but query by Chart, S. by E. $\frac{1}{2}$ E.) to clear Cape Terawiti.

Vessels from any of the anchorages between D'Urville Island and Queen Charlotte Sound, after passing Cape Jackson, should not bring that cape to bear to the northward of west, or should not steer to the southward of the north end of Mana Island, until Cape Terawiti bears S.E. by S., which will lead $2\frac{3}{4}$ miles outside Cook Rock.

Queen Charlotte Sound.—The entrance to this sound lies between Capes Koamoroo and Jackson, distant from each other little more than six miles in a north-west and south-east direction.

Cape Koamoroo is the southern head; it has a cone-shaped hummock on its extreme, and immediately inside it a higher hill 936 feet above the sea; it will also be known by its proximity to the Brothers Islands. A sunken rock with only one fathom on it at low springs lies $\frac{1}{4}$ of a mile from the extremity of the reef on the west side of the cape, and bears from the White Rocks S.E. $\frac{1}{4}$ E., from the cape W. by S. $\frac{1}{4}$ S.; the south end of Long Island just open of the Western Twin Rock leads $1\frac{1}{2}$ cables clear of the rock.

Cape Jackson, the northern entrance point, is a long, narrow elbow-shaped point, the extreme of a peninsula which separates the sound from Port Gore, to the westward; it is remarkable from its shape, flat towards the extreme, where it is 280 feet high, and rising at the elbow to 740 feet. Two flat black rocks lie off its outer extreme, the outer of the two one mile N.E. by N. from it, and three feet above high water; there are always tide rippings off them, and the tides set across the entrance of the sound with considerable strength on both points. "Boat Passage off Jackson Head. The s.s. Hawea reported having struck, drawing 14 feet, $\frac{1}{3}$ across from main in inner passage. The least water found on examination by Captain Fairchild, was four fathoms very uneven bottom. It is not recommended for vessels drawing over 12 feet."—*Gazette*, 1876.

DIRECTIONS.—Vessels entering Queen Charlotte Sound from the eastward may pass either side of Cook Rock as convenient; if southward of it, there is a clear width of three miles. Passing outside the Brothers Island at not less than one mile, Cape Koamoroo, which has no danger off it except the sunken rock above-mentioned, may be rounded at a convenient distance, and the White Rocks and Long Island passed on either side.

Entering the Sound from the northward or westward, there is a clear channel of five miles between Cook Rock and Cape Jackson; while White Rocks are kept open eastward of Long Island, a vessel will be to the westward of Cook Rock. When Alligator Head and Cape Lambert are open to the northward of Cape Jackson, a vessel will be two miles to the northward of the rock.

The White Rocks, Motuara and Long Island, lie in the entrance of the sound; the former are a ridge of peaked rocks a quarter of a mile in extent high out of water, bearing W.N.W., one mile from Cape Koamoroo, with a passage on either side; the two islands lie three miles within the line of the entrance capes; Motuara on the western, and Long Island on the eastern side; with passages between and on either side of them.

The sound runs in a S.S.W. direction 14 miles to the western entrance of the Tory Channel, then S.W. by W. 11 miles to its head; its drawback as an anchorage is the depth of water, which varies from 20 to 25 fathoms. It is indented on either side with numerous bays which afford secure anchorage, but the least depth of water is 16 fathoms, unless at the head of the sound. The only dangers in navigating the sound are a shoal patch north of Motuara (the Luke Rock), a sunken rock off the eastern point of Fly Bay, marked by a black buoy, one off Separation Inlet, and another with 10 feet water

(Hawea Rock) half a mile south-west of Pig Island. The land is high and generally thickly wooded to the water's edge, rising on the north side to an elevation of from 1,500 to 2,000 feet; on the south side are Mounts Robertson and Treble already mentioned.

Ship Cove.—At the entrance of Queen Charlotte Sound on the western side, abreast Motuara Island, are three coves, the southern of which is Ship Cove; this anchorage bears west from the south end of Motuara Island, with a depth of 10 fathoms, which is less water than is to be found in any other part of the sound, but it is less sheltered than the bays further within, and is more subject to heavy squalls and variable flaws of wind during bad weather, from the high land which rises immediately over it; vessels are in consequence liable to foul their anchors and drag, unless moored. The shores of the cove are rocky, and so steep that a vessel would almost bring up against the cliffs before she grounded.

A shoal rocky patch of 12 feet, having at its extreme a rock with six feet water, marked by kelp, extends $\frac{3}{4}$ of a mile north of the north end of Motuara. Vessels bound to Ship Cove from the northward, and passing between the north end of Motuara and the western shore should keep the latter on board; this channel is less than half a mile wide.

The passage between Motuara and Long Islands is three-quarters of a mile wide, least depth of water seven fathoms. Long Island is $2\frac{1}{2}$ miles long in the direction of the sound by half a mile in breadth; its western side is steep and cliffy; detached rocks lie off its north end, with a rock which shows at low water, two cables N.W. by N. outside them.* The passage between Long Island and the eastern shore is nearly three-quarters of a mile in width, with 20 fathoms water.

The Twins Rocks, high out of water, are three-quarters of a mile east of the north extreme of Long Island; and Cooper's Island is a quarter of a mile south of the Twins.

East Bay, on the western side of Alapawa Island, is an extensive inlet four miles deep, and $1\frac{1}{2}$ miles wide, separated from the sea by a steep narrow ridge; its entrance is one mile south-eastward of the south point of Long Island, and five miles south-westward of Cape Koamoroo; there are 25 fathoms water all over it; off its southern entrance is a cliffy island nearly one mile in extent—Pickersgill Island.

Pig Island, two miles south of Long Island, is over two miles long north and south, and $1\frac{1}{2}$ miles east and west; it is 1,023 feet high; there is a narrow channel (Patten Pass) between it and the south shore, with 24 fathoms water, but that to the westward is the fair channel up the sound.

Hawea Rock and Buoy.—A rock with 10 feet of water over it, lies about half a mile off the south-west end of Pig Island, marked by a *red* buoy.†

Western Shores of Sound.—The hill over the south side of Ship Cove has a bare yellow looking summit 1,353 feet high, and south of it Resolution Bay runs in for a mile, with the same width at its entrance, and 27 fathoms water. One mile to the southward is the most considerable on the north side of the sound, Endeavour Inlet, running northward four miles, with two arms, and 25 fathoms depth of water.

Many Coves Bay, the next, is a spacious anchorage; above it is Fly Bay, off whose eastern entrance point, S.W. $\frac{3}{4}$ S., nearly one-third of a mile, is Luke Rock, with three feet on it at low water, marked by a *black* buoy.

* H.M.S. *Challenger* in July, 1874, anchored in Queen Charlotte Sound, between Long Island and Motuara Island, in seven fathoms, with Twin Rocks in line with northernmost Long Island E. $\frac{1}{2}$ S. half a mile distant; this was found to be an excellent anchorage with south-east gales, the wind being far more moderate, and the ship lying easier at her anchor than at Port Hardy during the same sort of weather.—Remarks by Navigating Lieutenant T. H. Tizard, R.N.

† The following is from the "Nelson Almanac," 1880, viz. :—"A black buoy has been placed on a rock off the S.W. end of Pig Island. This rock is not placed on any chart, and is a continuation of the S.W. point of Pig Island, and has 16 feet on it at low water springs, it is therefore only dangerous to vessels of large draught. The buoy bears as follows—S.W. end of Pig Island, S.W. by S. half a mile Gullagull Point, S.E. by E., Bull Point, N.E. $\frac{1}{4}$ E."

The average width of the sound above Fly Bay is nearly one mile, the bays and coves are so similar in features that it is unnecessary to offer any particular description. The westernmost bay on the north side, Separation Inlet, runs two miles northward with a double head, separated from an arm of Pelorus Sound by a neck of land less than a mile across; the depth is from 9 to 13 fathoms; a sunken rock lies a cable S.E. by S. from its western cliffy entrance point.

The head of the sound is three miles above Separation Inlet, with an average width of little over half a mile, and 14 to 15 fathoms water, terminating in a sandy and shingle head, which dries for a quarter of a mile off shore, and shoal for nearly double that distance.

Waitohi Bay.—The westernmost bay on the south side is a double bay with a small islet lying off the middle head; there is anchorage in six and nine fathoms near the head of the eastern arm; at its head is the town of Picton (see Introduction), which is one of the ports of call of the international steamers; a red light is exhibited from sunset to sunrise at the end of the wharf, which has 15 feet water, with good accommodation for shipping. On entering, as soon as the light opens, steer for it.

The east point of Waitohi Bay is a remarkable sharp point called the Snout, with four round hills very similar in appearance rising over it. In the centre of the sound, one mile from the Snout, is the small round island, Negara, 300 feet high, with an islet close off its eastern side.

There are two bays and a deep narrow creek between Waitohi and Point Dieffenbach, the western entrance point of the Tory channel, a distance of six miles.

The ebb or southerly tide stream commences at 9h. 40m., and the flood or northerly at 3h. 40m. The flood tide entering the sound by Tory channel, flows outwards towards Long Island, until it meets the regular stream of flood; the strength between Motuara and Long Island is from $\frac{1}{2}$ to $1\frac{1}{2}$ knots. In the sound above the western entrance of Tory channel there is not much tide; at the head it is high water at 10h. 25m.

CAUTION.—During strong winds in Cook Strait, Queen Charlotte Sound is liable to heavy gusts off the high land and out of the mountain gullies, which give little or no warning, and it is necessary to use caution, especially with boats under sail.

WATER.—Streams exist in every creek, and wood may be had in abundance.

NOTE.—The name of Admiralty Bay is, to prevent confusion, now confined to the space between D'Urville Island, and the peninsula which forms the western entrance of Pelorus sound.

Port Gore, immediately westward of Queen Charlotte Sound, lies between Capes Jackson and Lambert, which are $3\frac{1}{2}$ miles apart, bearing nearly east and west; it extends in a south-westerly direction six miles.

The general depth of water is from 16 to 20 fathoms. Two miles within the entrance a bank extends across with from 9 to 12 fathoms on it; on the eastern side $3\frac{1}{2}$ miles above Cape Jackson there is anchorage in 11 fathoms half a mile off shore. Cockle Bay, in the S.E. corner of the port, has good shelter and holding ground in 15 fathoms, Melville Cove, on the western side, has anchorage in 12 fathoms, two cables from its head, and is preferable to the former.

In the centre of the peninsula, less than one mile from the head of Cockle Bay, Mount Furneaux rises to a height of 2,600 feet, and Mount Stokes the highest in the neighbourhood, $3\frac{1}{2}$ miles south-westward of the head of the port, attains an elevation of 3,900 feet.

Waitui Bay, between Cape Lambert and Alligator Head, is three miles wide at the entrance, and about two in depth; the shores are steep and cliffy; it is not a place of shelter.

Guards Bay, westward of Waitui Bay, between Alligator Head and Forsyth Island; with its inlets Titirangi and Akaloa affords shelter from all winds; the small island Motu Ngara lies in the entrance $1\frac{1}{2}$ miles N.N.W. of Alligator Head, with a reef awash at half ebb extending one-third of a mile eastward of its eastern end; the bay may be entered on either side of Motu Ngara, the channel westward of it is broad and clear.

Forsyth Island forms the western side of Guards Bay, is three miles long, north and south, and separated from the mainland by a very narrow channel with seven fathoms water in it.

The entrance of Guards Bay is $3\frac{1}{2}$ miles wide, with 20 fathoms between the heads, immediately within a bank stretches across, with eight and nine fathoms on it; two miles above the heads the bay is divided into two arms by a projecting cliffy point; the eastern Titirangi Bay, runs to the south-east nearly two miles, the western, Akaloa Bay, extends in the same direction for three miles; both have an average width of one mile, with good anchorage in from 10 to 14 fathoms mud.

There is anchorage on the western side of the bank just noticed under Forsyth Island in eight and nine fathoms, and with south-east winds on the southern edge of it, off the eastern point of Titirangi Bay in nine fathoms.

Pelorus Sound (See Charts of Cook Strait) lies between Guards and Admiralty Bays; it extends in a southerly direction about 25 miles, branching off into numerous arms and creeks, with no less than 250 miles of coastline. Its entrance on either side is formed by a peninsula, the western, is only half-a-mile across at the head of Cormilles Harbour; and the eastern has only a narrow neck of a hundred feet broad between it and the high westward of Forsyth Island, while an arm at the south-eastern head meets within less than one mile of Separation Inlet at the head of Queen Charlotte Sound.

GENERAL CHARACTER OF THE COUNTRY.—Except at the head of the main branch, the general character of the country is mountainous, rising with almost perpendicular acclivity to heights of from 2,000 to 3,000 feet, clothed with dense forests. The shores of the intervening bays receiving the mountain streams are equally impenetrable, as the sides of the ravine are steep and rugged.

ENTRANCE.—The north-west end of Forsyth Island, the eastern outer entrance point, and Harding Point the western, are little over two miles apart. Chetwode Islands lie immediately off, distant nearly two miles from either entrance point; they are two narrow islands three miles long, lying in a north-east and south-west direction, connected by a reef, and have rather remarkable hills, with sharp peaked summits 800 feet high; a reef of rocks above water extends half a mile N.E. of the easternmost island, and the Sentinel Rock, 65 feet above the sea, lies E.N.E. $1\frac{1}{2}$ miles from the north-east end of the same island; there are also heavy tide rippings about these islands.

Vessels may enter Pelorus Sound on either side of Chetwode Islands.

ROCKS.*—A rock high out of water lies in the eastern passage, a long half mile from the south-east side of the larger or south-west island. There is also a sunden rock, about three-quarters of a mile from the south end of Chetwode Islands, and the same distance south-west from the rock out of water, with five feet on it at low water springs. It may be easily avoided by keeping closer to Forsyth Island in passing through this—the western—passage.

Oke (or Richmond) Rock, which covers at half tide, lies in the Kakaho Channel, the passage between the Chetwode Islands and Entry Point, not more than three cables from the western shore, with 25 fathoms round it.

BEACON.—A small iron beacon, painted red, has been placed on Oke Rock, that shows $8\frac{1}{2}$ feet out of water at high-water springs. It is a single iron bar stayed with chains, surmounted by a cage 2 feet long and 18 inches wide. Should the beacon not be seen this rock may be avoided by keeping the reef, extending from the north-west end of Forsyth Island, on the starboard bow until west entry point is open, which clears it.

SOUNDINGS.—The depth in Pelorus Sound varies from 45 to 16 fathoms, gradually decreasing in the main branch towards its head, where it receives two rivers, forming shoal banks. With this exception, the rock just noticed, and Kainoki, a sunken rock off the entrance of Waihinau Bay, the second bay on the western side, there is no obstruction to navigation.

* "Canterbury Rock—a dangerous rock, lying in the track of vessels passing through French Pass north of the Chetwodes, and of those entering Pelorus Sound westward of the Chetwodes—lies about two miles off the latter, and about $4\frac{1}{2}$ miles from the mainland at the entrance to the Sound, with part of Ketu Bay open."—"Wellington Almanac." Captain McGillivray states that a patch with four fathoms on it lies westward of the position assigned to the Canterbury Rock, towards D'Urville Island.

BAYS AND ANCHORAGES.—Beginning at the east entry point, the first bay is Ketu, one mile within, with 30 fathoms across its entrance. At its head is Sng Cove, having 10 fathoms. Richmond Bay (Kopaua), immediately beyond, is $1\frac{1}{2}$ miles deep. The anchorage is at its head in 14 fathoms, the neighbouring mountains rising 1,800 feet. There is another sheltered bay before reaching Takaka Point, immediately opposite Orieri Island, the channel between is one mile wide and 40 fathoms deep. Here the main branch bends eastward, while another, Tawhitinui Reach, stretches nine miles to the south-west.

Opposite Tewero Point, a bare point two miles E.S.E. of Orieri Island, and two miles east of Takaka Point, is Kanauroa Bay, a good anchorage, two miles eastward of which is Whakamawahi, an extensive arm with three branches—the Hikuraki, separated from the head of an outer bight by a narrow neck only 100 feet across, and also about the same height; the middle, Mamiaro, having land remarkably bare for Pelorus Sound; and the third, Karepo, which runs south five miles, with excellent anchorage.

S.S.W. from Tewero Point, the next reach for seven miles is Popoure, with Pokohino Bay on the east side; the Tamuakaiwawi, Piaukahe, and Opouri Bays on the west; the latter have the best anchorage; the channel of this reach has 27 fathoms mud.

The next reach, Pinohia, or Hikapu, running southerly for the same distance, is less indented; with anchorage at its head.

Eastward of Pinohia is the long arm of Toreamounou, or Kipuru Sound, extending 12 miles E. by N., having a depth of not more than 14 fathoms, gradually decreasing towards the head, and an average width of three-quarters of a mile.

Mahan Sonnd, southward of the last, is three miles in length, divided from it by a narrow ridge, Putahuia; at its head there is a level plain, one mile long, and $1\frac{1}{2}$ miles in breadth, extending to Toreamounou arm; Ohingoroa Bay and Moi Tapu Bays on the South side of Mahau Sound, have cultivated land one mile S.S.W. of the anchorage.

Mahakipawa arm, three miles above Mahau Sound, is very shoal; its head is within an hour's walk of a part of Queen Charlotte Sound. Near its eastern head the rivers Hoiere and Kaituna meet, forming banks, and leaving channels only navigable for small boats. The town of Havelock is situated here.

Tawhitinui Reach.—Returning to the entrance of the sound, Tawhitinui Reach extends on the western side abreast Orieri Island for nine miles to the south-west; this arm differs from all other parts of the sound by having in it Orieri Island, and the three smaller islets, Tawhitinui, Awaiti, and Oaie, the latter in that part of the reach where the Croisilles Harbour is separated by an easy half hour's walk over a hill of 600 feet elevation.

Kawai Sound, at the head of this reach, has four bays, all of the same character, backed by mountains from 2,000 to 3,000 feet high.

Apua Channel, westward of Orieri Island, is half a mile wide, with 27 fathoms in it; there is a double bay to the westward (Fitzroy Bay). The ranges are very high and precipitous.

Outwards from Orieri Island, on the west coast of the sound, is Waitata Bay, perfectly clear, with 14 fathoms throughout; the entrance points are Kaiaua, a yellow point, and Moitera, having a white rock off it resembling a boat under sail.

ROCK.—Wahinau, the next bay, is considered a good anchorage by the natives, the squalls of wind not being so heavy as those on either side; a dangerous rock (*Kainoki*) is at the mouth of this bay, awash at low water; from it Danger Point (the north point of the bay) bears N.N.W. half a mile, and West Entry Point N.E. by E. $1\frac{1}{4}$ miles.

Port Ligar, immediately within West Entry Point, is a fine harbour, equal to any in Cook Strait; the outer portion (*Kopi*) has from 14 to 17 fathoms water; the northern shores are separated by a narrow neck a quarter of a mile wide, from Admiralty Bay. The north entrance point is a long yellow clay point tapering to the water.

From West Entry Point the land trends northerly $2\frac{1}{2}$ miles to Harding Point opposite Chetwode Islands, thence westerly to Admiralty Bay.

In Pelorus sound there are at least 30 bays or anchorages, mostly land-locked, and safe in any winds: the gusts in bad weather are very furious.

WATER AND FISH.—Fresh water may always be obtained. Fish in abundance may be caught off the points.

TIDES, WINDS, &c.—It is H.W. F. & C. at the entrance of Pelorus Sound at 9h. 35m.; rise—springs 11 feet, neaps 7 feet. The tides in the stream run from two to three knots, but they are scarcely felt at the anchorages. The prevailing winds blow down the reaches from seawards, but south-east winds, lasting forty-eight hours, accompanied by heavy rains and violent gusts, are not uncommon.

Admiralty Bay lies between D'Urville Island and the peninsula which forms the western entrance of Pelorus Sound. It runs in a south-westerly direction for seven miles, and is four miles wide at the entrance, off which are the Trio Islands, and four miles to the north-east of the latter the Jag Rocks.

Trio Islands.—The centre and largest is triangular in shape, and about one-third of a mile in length; the other two are small, and lie half a mile northward and southward of the central islet, with shoal water between.

Jag Rocks, a cluster, covering nearly half a mile in a north and south direction, are 40 feet high. They lie three miles eastward of Rangitoto Islands, and bear S.E. $\frac{1}{2}$ S. nearly seven miles from the centre of Stephens Island.

D'Urville Island projects as a bold and salient point into Cook Straits from the eastern shores of Blind Bay, is 17 miles long north and south, five to six east and west, and separated from the mainland by a very narrow channel (the French Pass). It is mountainous and wooded. Entering Cook Strait from the westward, D'Urville Island is generally the first land made, and in clear weather its mountains (the highest 2180 feet) are easily distinguished at the distance of 40 miles.

Stephens' Island lies two miles north-eastward of the northern extreme of D'Urville Island, and is one mile in extent, rising abruptly from the sea to a height of nearly 1,000 feet. There is no safe passage between these islands, though coasters acquainted with the dangers sometimes avail themselves of the channel.

Rangitoto Roadstead, a convenient anchorage, with westerly winds, ranging from north to south, is on the eastern side of D'Urville Island, four miles from Cape Stephens, the northern extreme, in the southern bight of the bay, about one-third of a mile off shore. A remarkable double-peaked mountain, the Ears, 1,525 feet high, rises a mile to the south-westward. The water is deep, 12 to 14 fathoms close in shore.

The best approach to the anchorage is southward of Rangitoto Islands, a group three in number, lying half a mile off shore, extending $2\frac{1}{2}$ miles in a north-east and south-west direction.

TIDES.—The tide sets between Rangitoto and D'Urville Islands at the rate of one to three knots, the flood running northward, ebb southward, at the anchorage a vessel will be nearly out of its influence.

Port Hardy, at the northern end of D'Urville Island, lies between Cape Stephens and Nile Head, which bear N.E. and S.W. from each other, distant four miles.

Vessels making the port from the eastward should pass northward of Stephens Island, as there are two cluster of rocks in the passage between it and D'Urville Island, the Saddle and Tower Rocks, and the tides are very strong in the passages; several rocks high above water also extend half a mile north-west of Cape Stephens.

Nelson Monument and Victory Isles are in the entrance of Port Hardy, the former a high rock one mile to the eastward of Nile Head; the latter a cluster of small islands south-eastward of and the same distance from the monument, with the Fleet (a cluster of rocks) extending southward from them to the eastern shore.

The passage into the port is on either side of Nelson's Monument, in deep water; the widest channel is between it and Victory Islands, as a reef

extends $1\frac{1}{2}$ cables off both Nile and Trafalgar Heads—the outer and inner western entrance points—which narrows the channel on that side.

The tides set directly across the entrance, the flood to the westward, the ebb to the eastward; due allowance must be made for this in entering; in bad weather a confused sea gets up here, which renders Port Hardy less desirable as a harbour of refuge for a sailing vessel during a gale than the adjacent ports eastward and westward.

When inside Nelson's Monument the port runs S. by W. $2\frac{1}{4}$ miles, with an average width of three-quarters of a mile, when one arm takes an easterly direction, and the main branch continues its southerly trend, both for about two miles, with an anchorage in 14 fathoms; no less depth will be found in any part of the port.

WATER.—Fresh water may be always procured from the streams in any the coves.

Off Stephen's Island the flood or north-westerly stream begins at 5h. 15m., and the ebb or south-easterly at 11h. 15m.

Greville or Brooke Harbour is on the western side of D'Urville Island, $6\frac{1}{2}$ miles southward of Nile Head. Mount Woore, the highest land of the island, 2,180 feet high, rises over its northern shores; the entrance points lie north and south of each other, one mile apart, and a rock four feet out of water lies a quarter of a mile N.W. of the south entrance point (**Rugged Point**).

The harbour runs S.S.E. $1\frac{1}{2}$ miles, with a width of nearly one mile, the depth from 7 to 10 fathoms; an arm then runs to the eastward for the same distance, with from 7 to 15 fathoms, which is nearly closed by two boulder spits projecting from either shore at the entrance; for large vessels there is no protection from north-west gales. From this harbour, the coast of D'Urville Islands trends S. by E. six miles to its south-west extreme, **Sauvage Point**.

Current Basin and French Pass.—The entrance lies between Sauvage Point and Hole in the Rock Point on the main land; Lebrun Peninsula, a short distance within Sauvage Point, extending—with the rocks off it—more than half a mile to the southward, leaves the width of the entrance about three-quarters of a mile, with nearly in the centre the **Piège Rocks**, three rocks above water, bearing from Sauvage Point S. $\frac{1}{4}$ E. three-quarters of a mile.

The **Chicots**, three larger rocks above water a quarter of a mile in extent, lie W. $\frac{1}{2}$ S. $1\frac{1}{2}$ miles from the same point, with a reef nearly a mile to the north-eastward, between them and the shore of D'Urville Island.

ROCK AWASH.—A rock about 50 yards in extent, between the **Chicots** and **Sauvage Point**, bears from the largest of the former E. by N. $\frac{1}{2}$ N. 7 cables from the latter W. by N. $\frac{1}{2}$ N. $5\frac{1}{2}$ cables, and is just without the line from the high water extreme of Lebrun Peninsula and **Sauvage Point**; it is steep-to. As it is only visible at low water, vessels passing between the **Chicot Rocks** and D'Urville Island must be careful to avoid it.

The channel is deep on either side of **Piège Rocks**:—**Current basin** then runs to the N.E. three miles to **French Pass**, with a width of nearly one mile, and a general depth of from 15 to 20 fathoms, rocky and gravel bottom.

French Pass is the narrow strait between the southern part of D'Urville Island and the main land, affording communication between Admiralty and Blind Bays; its narrowest part, between Reef Point on the north, and Channel Point on the south, is 540 yards across at high water; but a reef of rocks extending from the former point in a S. by E. direction about 400 yards, leaves only a clear and straight channel of 117 yards between their extreme and the low-water mark of the south shore, both being perfectly steep-to; on the extreme of the rocks, which are only uncovered at low springs, an iron perch is placed, so that vessels passing through at any time of tide can see exactly the breadth of the channel, and may pass as close as 10 yards to the iron perch if necessary.

Rock Cod Point, two cables southward of Channel Point, has sunken rocks extending S. by E. 100 yards from it, for which due allowance must be made, as the tides are stronger there than in the pass; there is also an awkward shell bank—the **Middle Bank**—with eight feet at low water

before reaching the pass, from the Current basin side; it is three cables long, in a north-east and south-west direction, and one cable in width, its northern extreme is only two cables from the perch on the reef.

BUOY.—There is a white buoy on the north-eastern edge of the Middle Bank, rendering the navigation of the channel much easier. "This buoy has been re-laid a little to the eastward of its former position, and is now moored in three fathoms at low water springs"—"Wellington Almanac." The distance from the north-eastern edge of the bank to Rock Cod Point is $1\frac{1}{2}$ cables, it follows that the seaman must judge his distance should the buoy, from any cause be removed, for the points being so much alike, and the tide so rapid, natural leading marks would be likely to lead into error.

On the western side of the pass there is a rocky patch $1\frac{1}{2}$ cables N.E. from Reef Point, but it is not in the track of vessels passing through. "A patch about 100 yards in extent with 8 fathoms mud, lies about in a line between Point Collinet and Reef Point, off the north-east entrance to the Pass, a little westward of the fairway and about the place where 53 fathoms is marked on the chart; it forms an excellent anchoring place for vessels waiting for the tide."—Capt. McGillivray.

TIDES.—The tides, instead of setting directly through the narrow channel, set across more in a line from Rock Cod Point to Channel Point, and the contrary, and a tidal irregularity which though not of rare occurrence is especially remarkable in this pass, viz., that the ebb stream running to the eastward commences for two hours before actual high water by the shore, the tide at the same time rising in Current Basin and the French Pass; the extraordinary nature of the bottom, in connection with the narrowness of the channel, is quite sufficient to account for the whirling of the current, the depth varying from 7 to 54 fathoms, without reference to the distance from the shore or rocks.*

BLIND BAY—FROM D'URVILLE ISLAND TO MOTUEKA RIVER

Blind Bay is in width from D'Urville Island to Separation Point, its north-western extreme, 36 miles, and its depth within these limits is 25 miles.

Nelson Haven lies at its head. On its eastern shores is Croisilles Harbour; on its western are several anchorages, namely, Tonga Roads, Torrent Basin, Astrolabe and Fisherman Roadsteads, and the Rivers Motueka, Motuere, and Waimea. The depth of water in the outer parts of the bay varies from 25 to 28 fathoms, shoaling gradually to 12, 9, and 5 fathoms within two miles of its head.

It is entirely free from danger, and the winds seldom blow home with violence in the upper parts. It is frequently fine and calm weather at Nelson when a strong north-west gale is blowing in Cook Strait.

* In offering an opinion on the French Pass as an available channel for shipping, it may be observed that it is perfectly straight, and sufficiently broad and deep for the largest ships, being twice the width of the entrance to Nelson Haven, and its narrowest part is passed in a few seconds. No sea can get up, and anchorage can be found on either side, but not in the Pass. On the other hand, the chances of hitting the correct time of tide, the possibility of having to anchor, and of the wind failing, and the consequent risk of being carried on the rocks by the current, are disadvantages which the saving of 12 or 15 miles do not compensate for, or warrant the risk. It cannot therefore be recommended for large vessels; but by coasters it may be, and often is, used with advantage, anchoring in Current Basin, and passing through at slack water, and by this means avoiding a heavy cross sea, which is often met with off the north end of D'Urville and Stephens Islands. With regard to steamers, a vessel that could command a speed of eight knots would generally pass through at any time of tide.

As a fishing place this pass is equal, if not superior, to any other part of New Zealand. Boats could load with hapuka, rock cod, and barracouta in an incredibly short time."—Remarks by Commander Drury, of H.M.S. *Pandora*, 1855.

"The colonial authorities, however, condemn its use as an ordinary passage, and say that, notwithstanding the French Pass is constantly used by the mail and coasting steamers running between Nelson, Picton, and Wellington, they never pass through against the tide always going round D'Urville Island; and considering the eddying nature of the currents it is dangerous to attempt to do so, as a very slight sheer would ground a vessel in a moment. At slack water with the tide there is no danger to a steam vessel handled with prudence. H.M.S. *Brisk* steamed through this pass on two occasions, once at slack water and once with the tide."—Remarks by Captain C. W. Hope, H.M.S. *Brisk*.

The land at the head of Blind Bay is low, with some remarkable white cliffs, but on either side it is mountainous. The Castor Peaks, over Croisilles Harbour, Mount Duppa, and Double Mount, over the eastern side of the bay, are from 3,000 to 4,000 feet high. Mount Rintoul, a remarkable sharp cone 4,720 feet high, lies 15 miles south of Nelson. On the western side the land rises gradually from Separation Point, eight miles southward of which two peaks rise to heights of 3,700 feet. A high and generally snow-capped range extends from them southerly nearly 20 miles, terminating in Mount Arthur, which is 5,800 feet above the sea level.

Croisilles Harbour is easily accessible, affords good shelter in all weathers, and is the best eastern port of refuge in Blind Bay for vessels of any size caught in north-west gales. Three small islands lie to the westward and southward of its northern entrance point, at distances of nearly two miles. The westernmost is a high conical island, with rocks extending seaward from it nearly a quarter of a mile, almost awash at high water; the southernmost is Williams Island. Within these islands is foul ground and shoal water. It will be advisable in entering to give them a berth of half a mile.

The entrance between these isles and Cape Souci is nearly two miles wide, with a depth of 16 fathoms. Working in, after passing Williams Island, vessels should not stand northward of a line between it and the inner north entrance point, Drift Roundhead. There is good anchorage in seven fathoms, mud, between this island and the head, the island bearing W. $\frac{1}{4}$ N., and the head N.E. by N. three-quarters of a mile distant.

If desirable vessels may proceed from 1 to $1\frac{1}{2}$ miles above the inner north point, where there is excellent anchorage in seven fathoms. Hunakiwa bay, on the south side is exposed, and not recommended for anchorage. At the head of the south-east arm (Squally Cove), a narrow isthmus, half a mile across, and 560 feet high, separates Croisilles Harbour from Pelorus Sound.

WATER.—Water may be obtained from a stream on the north shore one mile above the inner north entrance point.

Pepin Island, nearly ten miles S.W. of Croisilles Harbour, is close to the mainland, and appears like a point of it, being united at high water by a sandy beach. Vessels running for Nelson on this side of the bay may pass a convenient distance off the land, which appears to be bold and free from dangers. At Whakapuake in the bight to the S.E. of Pepin Island, the shore ends of the cables to Australia and to Wanganni river are laid.

Nelson Haven.—The entrance to Nelson Haven is ten miles S.W. of Pepin Island; at the distance of six miles from the entrance commences the long and remarkable Boulder Bank, whose southern portion forms the natural breakwater to that anchorage.

The available space for anchorage in Nelson harbour is limited for vessels of large tonnage, and the approach to it is exceedingly narrow, with strong tides.

PILOT.—It is absolutely necessary for a stranger to engage a pilot; an excellent one employed by Government is stationed at the entrance, and is always ready with his whale boat.

LIGHT.—The lighthouse (a white tower) on the Boulder bank, one mile northward of the entrance channel, exhibits a *fixed white light*, visible from seaward through an arc of 120°, from S. by W. $\frac{3}{4}$ W. round East to E. by N. easterly (north of which it shows *red* towards the Waimea banks, see Chart). It is 60 feet above the level of high-water springs, and should be seen in clear weather 12 miles. It is about 10 miles south-westward of Pepin Island, and half a mile N. by E. of the powder magazine, in latitude 41° 15' 4" S., longitude 173° 17' 7" east.

"The lighthouse is not on the Boulder bank as shewn in the Chart, but on the bank or island always three to six feet above high water on the same line of bearing as the Chart shews. The light also shews *red* between the bearings of E. by N.—the south limit of the *white light*—to N.E. by E., the approximate position of the outer white buoy. The two beacons on shore for entering the inner harbour are—upper one, *white*; lower one, *red*; they shew similar lights at night. The light on pilot-house is discontinued. A

white light is shewn at night on the beacon off Haul-ashore Point, on its being known that a vessel is coming in. The clump of trees on with a ravine in the mountains does not exist, the trees having disappeared, but a large white house stands where the trees were. It is a difficult mark for a stranger."—*New Zealand Gazette*.

The harbour is between the mainland and the Boulder bank; the latter is very narrow at high water, and is in one place then covered, with a boat channel over; there are also two patches, which may be called islands, always well out of water. Haul-ashore Island, little more than a cable in extent, is at the southern extreme of the bank, with a single bush on its outer end; the other is a small patch half a mile northward of Haul-ashore Island, with a magazine on it.

The Arrow Rock, a high sharp rock, lies in the centre of the entrance a short cable south of the edge of the Boulder bank, which latter is marked by a beacon; between the two is the entrance ledge, with only three feet water on it at low tides; the passage in is to the northward of this ledge, between it and the beacon, and does not exceed 50 yards in width.

BUOYS—Buoys mark the channel leading to the entrance, a *red* buoy surmounted with a white beacon lies off the extreme end of the Waimea sand in $3\frac{1}{2}$ fathoms, low water, the lighthouse bearing E. by N. easterly three-quarters of a mile, and the fairway buoy S. S. E. $\frac{1}{2}$ E., the inner buoy is two cables and the outer one six cables outside the Arrow Rock; one-third of a cable S. S. W. from the inner buoy is the fairway buoy *red with black* beacon in $3\frac{1}{2}$ fathoms. The inner edge of the bar is a quarter of a mile outside the outer buoy; the bar is three cables across, with nine feet on it at low water.

Vessels of large tonnage can therefore only cross the bar and enter the harbour at or towards high water, when there is at springs a depth of 21 feet.

With a strong northwest wind a vessel would scarcely run for Nelson Haven, but take shelter in Croisilles Harbour until it moderated; it is not often, however, that this wind blows home with any violence at the head of Blind Bay.

DIRECTIONS FOR ENTERING NELSON HAVEN.—Vessels running into Blind Bay for Nelson with a fair wind should get the eastern shore on board, and make the Boulder Bank from two to three miles northward of the haven, running along its outer edge under easy sail at the distance of a mile, carrying six or seven fathoms water.

OUTER ANCHORAGE.—There is a good anchorage outside the bar in all moderate weather, with the lighthouse S. E. in five to six fathoms water, distant three-quarters of a mile. Mariners are *cautioned* not to run out of the white into the red light, but to keep well within the former.

The marks for crossing the bar in the deepest part, are a remarkable clump of trees, nearly two miles southward of the harbour entrance on the low land, kept just eastward of Mount Rintoul; this conical mountain will be readily recognised unless the weather is thick. These leading marks are a good guide to the more definite ones of the same clump of trees in line with a remarkable ravine in the mountains, bearing S. $\frac{1}{2}$ E.; with these marks on, and the magazine in line with Green Point (the north extreme of Signal Hill), a vessel is on the outer edge of the bar, and the outer buoy will be on the starboard bow; pass half a cable eastward of it, and steer for the inner buoy, which is S. E. by E. $\frac{1}{2}$ E. 4 cables distant; pass close northward of the inner buoy, when the Arrow Rock will be little more than two cables distant; the beacon on the edge of the Boulder Bank will then be seen, and also the leading marks throughout the Narrows, which are two large *white* spar beacons, surmounted with a Ball and Triangle, at the entrance on the mainland, kept in one E. N. E. (The Storehouse door just behind them, and the chimney of Stafford's house also in the same line, were the marks for entering before the beacons were erected.) "Two beacons have been erected to be kept in one on entering, lower beacon with triangle—Red; upper beacon with circle—White. By night a red and white light will be exhibited on their respective beacons."—"Nelson Almanac." These marks will lead northward of the entrance ledge, passing the beacon on the tail of the Boulder Bank at the distance of 25 yards; when the bush on south-east end Haul-ashore Island bears N. W. by W. $\frac{1}{4}$ W., or the vessel is midway between it

and the upper beacon on the starboard shore, haul up sharply N. by E, $\frac{3}{4}$ E., or keep little more than half a cable off the wharf ends.

ANCHORAGE.—Anchor just above the second wharf, with the bush on Haul-ashore Island in a line with the Arrow Rock; a good anchorage is in this line, and abreast Green Point, in seven fathoms mud at low water, when the body of the town of Nelson will be just open; it is necessary to moor. The best anchorage for a large vessel is just round Haul-ashore Island, with the beacons E.S.E. in five to six fathoms mud, as there it is still water, and the ship is moored head and stern, there being a mooring buoy for the stern chain. “Two mooring buoys, painted black, are laid down in the harbour.”—*Nelson Almanac.* Small vessels and coasters enter Nelson Haven with ease on the flood tide, and under the skilful guidance of the pilot vessels of 1,000 tons have been conducted to safe anchorage with scarcely less facility. To enter, a vessel must have a wind which will enable her to lay E.N.E. through the narrow channel between Arrow Rock and the Boulder Bank; after the tail of the latter is passed the tide will take her to a berth.

After heavy rain, freshets increase the strength of the tide considerably, thereby rendering the turn in the passage dangerous, the current strikes the vessel on the port bow and would set her on shore if helm is not promptly given, the channel being only half a cable wide abreast of the beacons.

CAUTION.—It must be observed that the preceding directions, though accompanied by the elaborate and clear plan published by the Admiralty, ought not to justify a stranger in attempting to enter the haven without a pilot unless in great emergency.

The streams of tide change 0h. 17m. after high and low water at springs: the flood runs for 7h. 10m., and the ebb 5h. 40m. The tides run rapidly along the eastern shore of the harbour, but by anchoring in the line directed a vessel will be out of the influence of their greatest strength.

In consequence of the great range of tide, Nelson haven is one of the few places in New Zealand where a vessel of large tonnage may be beached for repairs.

Bolton Hole Anchorage, four cables westward of Haul-ashore Island, or between the tail of the Boulder bank and the eastern end of the Waimea bank, there is anchorage in six and seven fathoms, sheltered in some measure by the bar outside it; a good berth is in the line between the buoys, with the south end of Haul-ashore Island in one with Stafford's house.

Anchorage in Waimea River.—“The Harbour Master at Nelson has reported that the entrance of Waimea River has of late silted up, at low water only 5 feet instead of 14 feet as formerly.—*New Zealand Gazette*, September, 1875.

The central and western mouths of Waimea River are respectively $2\frac{1}{2}$ and $6\frac{1}{2}$ miles westward of Nelson, and navigable for coasters. Two miles N.W. of the western mouth commence the White Cliffs, which extend more than three miles along the coast, 250 feet high, and seen a long distance from seaward.

The coast between Nelson Haven and the White Cliffs is shoal, having $4\frac{1}{2}$ fathoms at a distance of $2\frac{1}{2}$ miles from it; north-eastward of their southern or highest part, more than two miles off shore, there is a patch of less than three fathoms. At the north-west end of the cliffs is the Moutere River, which has two entrances two miles apart, it is smaller than the Waimea. $3\frac{1}{2}$ miles northward is the Motueka River, and two small low islets, with sand flats between, extending nearly one mile off shore.

“**MOTUEKA.**—Beacons painted *red* on starboard side on entering, *black* on port; black buoy at entrance. There is steam communication with Nelson.”—*Nelson Almanac.*

BLIND BAY.—FROM SEPARATION POINT TO MOTUEKA RIVER.

Separation Point, the north-western extreme of Blind Bay, separating it from Massacre Bay to the westward, is a small cliffy projection connected by a neck with high land rising immediately from it.

$\frac{1}{2}$ miles S.E. of Separation Point is a remarkable white stripe in the cliffs, which can be seen at a long distance, and be advantageously used as a mark for clearing the end of Cape Farewell Spit.

Awarua Bay, three miles in extent, with sandy beaches, and from seven to ten fathoms water, lies immediately southward of the white stripe, with anchorage off in ten fathoms in moderate weather : from its southern point, which is rugged and cliffy, the coast, of the same character, extends $2\frac{1}{2}$ miles in a south-easterly direction to Reef Point, the north point of Tonga Roadstead. Capt. Fairchild says : "A dangerous reef runs to the N.W. a long half mile further than shown on chart. It breaks in bad weather."

Tonga Roadstead.—This is a snug anchorage with all westerly winds from north to south. The bay is half a mile in depth, with a smooth sandy beach at its head. The small island of Tonga, about two cables in extent, lies off the centre of it. The anchorage is about four cables westward of the island in eight fathoms. There is a passage on either side of Tonga Island. That to the northward is over three cables wide, with eight and nine fathoms ; the southern is half a mile wide, with six to ten fathoms. Vessels entering northward of the island must avoid a reef which extends off Reef Point over a cable. (See plan.)

Torrent Bay (see plan), the next anchorage, is $3\frac{1}{2}$ miles south-eastward of Tonga Island. The intermediate coast is cliffy, with small sandy coves. Several rocks extend more than half a mile off shore, and a long reef awash about midway between the two anchorages, with a small islet one mile southward of it. This part of the coast should not be approached within one mile.

Torrent Bay is more than half a mile in width between North and Jetty Points. The basin in the southern bight affords good shelter for small vessels in 3 to $3\frac{1}{2}$ fathoms, except in north-east winds. In the outer part of the bay there is good anchorage in six and seven fathoms with off-shore winds. Three torrents discharge themselves into the basin through deep ravines : hence its name.

Astrolabe Road (see plan) is a mile southward of Torrent Bay. The anchorage is between Adolphe Point and Adele Island, which is nearly one mile long, and four cables from the shore.

Hapuka Reef—with an iron beacon and cage (*red*) 13 feet high on it—dries two feet at low springs. It lies quarter of a mile eastward of Adolphe Point, with a narrow channel between with 6 fathoms water.

There is also a sunken and dangerous rock, with six feet on it at low water, lying in the entrance, a quarter of a mile north of Jules Point, the north-east extreme of Adele Island. The main channel between this rock and Hapuka Reef is four cables wide, with eight fathoms water. There is also a narrow passage between the rock and Jules Point, with the same depth of water.

CLEARING MARKS.—When on sunken rock, the outer summit of Tonga Island is seen midway between Adolphe Point and Hapuka Reef. It is avoided by keeping the latter reef on board within about a quarter of a mile in entering. The north end of the sandy beach northward of Guilbert Point on the mainland just open of the north-west cliffy extreme of Adele Island clears to the northward of it.

ANCHORAGE.—The anchorage is half a mile within the entrance points in mid-channel, in six fathoms, the passage between Adele Island and the mainland being open. This passage is nearly half a mile wide in its narrowest part, with 12 feet the least depth at low water, so that a small vessel can obtain shelter from all winds on the west side of Adele Island. Astrolabe Roadstead will be found a snug anchorage with all westerly winds from north to south.

TIDES.—It is H.W. F. & C. in Astrolabe Road at 9h. 10m. ; springs rise 14, neaps 10 feet. The tides are not much felt in Blind Bay, varying from a quarter to one knot along the shores, but with northerly winds a current generally sets to the southward at the rate of nearly one mile an hour.

Fisherman Roads are southward of Adele Island, between it and Fisherman Island, an adjacent rocky islet. It is three cables across the entrance, with good anchorage in 20 feet at low water, midway between the two islands.

CAUTION.—From here the Motueka River is four miles to the S.E., with sandy bays and small coves on the coast between, where shelter may be had for boats; but large vessels running down this side of the bay should keep at least two miles off shore, and when approaching to abreast the White Cliffs increase their distance to three miles. “Riwaka light: a light is exhibited at the store, Riwaka River (about $1\frac{1}{2}$ miles north-westward of Motueka River), about 12 feet above the level of the sea, showing *green* northward, *white* eastward, and *red* southward, and will be altered as the river shifts. N.B.—The light will only be shown when required, and mariners are warned not to be guided by it, unless well acquainted with the river.”—Nelson Almanac.

FROM SEPARATION POINT TO CAPE FAREWELL.

Massacre Bay, the westernmost anchorage in Cook Strait, lies between Separation Point and Cape Farewell, the north-west extreme of the South (Middle) Island of New Zealand; the land on both the western and southern sides is high.

Cape Farewell terminates rather abruptly, its extreme showing from the eastward like an isolated cliff, descending in steps to the westward: the land immediately within it is from 400 to 600 feet high, and five to six miles southward mountains varying in height from 1,000 to nearly 4,000 feet extend to the south-west until they nearly meet the Aopuri range, which is some 15 miles westward of the Separation Point range, and from 4,500 to 5,500 feet high.

The most remarkable coast mountain on the western shore of Massacre Bay is Mount Burnett or Knuckle Hill, with a double rounded summit; the northernmost and highest is 2,085 feet high; it is nearly nine miles S.W. from Cape Farewell, and about two miles from the beach; it can be advantageously used as a leading mark to clear Farewell Spit.

Farewell Spit extends from Cape Farewell in an easterly direction 17 miles, slightly curving to the southward towards its extreme, and is the danger which ships must be careful to avoid in entering Cook Strait from the northward and westward; it is a treacherous spit, a great part of its eastern extreme being covered at high water, and its southern or inner side being very steep-to.

The portion always above water extends 13 miles from Cape Farewell with an average width of a little more than half a mile; composed of low sand mounds partially covered with vegetation. There is a cluster of bare sand hillocks midway between the cape and the extreme, the highest of which is 90 feet above the sea, and at the high-water extreme, or Bush-end Point, are several scattered bushes growing.

SOUNDINGS.—From Bush-end Point, the low water extreme of the spit which dries in patches, extends S.E. by E. 4 miles, and the water shoals suddenly at the distance of $1\frac{1}{2}$ miles outside it, from 25 to 5 fathoms. On the northern or outer side of the spit the water shoals gradually from 40 and 35 fathoms (sand) 5 miles off shore, to 14 fathoms within one mile of it. Capt. Fairchild says, “The spit has shoaled seaward considerably since the last survey was made.” On the southern or bay side the sand dries in patches for more than three miles from the high-water edge of the bank, and in some parts for even six miles to the southward, there are only a few feet water, shoaling suddenly to that depth from 7 and 20 fathoms.

LIGHT.—The lighthouse on Bush-end Point is 113 feet high, painted in alternate bands of red and white. The light is a *revolving* white light, excepting in the direction of the spit end, between the bearings N.W. $\frac{1}{4}$ N. and W. by N. $\frac{1}{4}$ N. where it is *red*, attaining its greatest brilliancy *every minute*; it is elevated 120 feet above the level of the sea, and in clear weather should be seen at a distance of 17 miles. The light is shut in by the sand hills to the southward of E. by S.

CAUTION.—Vessels should not open the northern edge of the red light when within four miles of the lighthouse.

Tasman's Corner, in the north-west part of Massacre Bay, four miles in extent, is a good anchorage in seven and eight fathoms, well sheltered from easterly winds by the banks just mentioned extending to the

soathward of the spit, forming its eastern boundary. Fossil Cliff, the eastern extreme of Cape Farewell, not brought to the westward of N.W. by N., will clear westward of the banks.

ANCHORAGE.—Some patches of this bank are always dry, which will be the best guide, anchoring two miles to the westward, or midway between them and the shore; Mount Burnett bearing S.W., and the Fossil Cliff N.N.W., in seven fathoms.

To south-east winds the anchorage is in a measure open, but no heavy sea could get up; and there is no reason to doubt that with good ground-tackle a vessel would ride out any gale from that quarter. A heavy surf, with only a moderate wind, frequently sets on the beach, which is shoal for nearly one mile off.

Aorere River.—The entrance is $1\frac{1}{2}$ miles southward of Mount Burnett; its southern head is a streaked cliff; the northern, a sandy point. The bar extends more than a mile off shore, and is dry at low water, except a narrow channel with one foot water in it.

Coaling Road.—From Aorere River the coast trends south-eastward eight miles to Coaling Road, six miles westward of Separation Point, with good anchorage with southerly or easterly winds off the Motu Pipi River in four fathoms, $1\frac{1}{2}$ miles from the shore at high water; at low water the sands dry nearly one mile from the river's mouth, and large boats only can enter at half flood. Coasting vessels are built here.

COAL.—Coal was obtained with much facility from the face of some remarkable white triangular-shaped cliffs at the river's mouth; but as far as it had been superficially worked, found to be of an inferior quality, and highly sulphureous.

Tata Anchorage.—On the eastern side of Coaling Road, three miles E.N.E. from the anchorage, and four miles south-westward of Separation Point, is Tata Point, and two small islands of the same name; within these islands is a small anchorage where two or three small vessels may obtain good shelter from N.W. winds. A vessel of large tonnage might also get shelter by passing close round the south end of the southern island, and dropping her anchor just within.

There is a passage for small vessels between the two islands, but not between the northern island and the main, as a bar of five feet extends from the centre part of the former directly across; northward of Tata anchorage is Burial Bay, with a sandy beach and shoal a short distance within the points.

Directions for Entering Massacre Bay.—The depth of water in Massacre Bay is from 10 to 20 fathoms; it affords good shelter, in all parts, with north-west winds; the only danger is Farewell Spit, for which is given the following directions:—

A vessel running for Massacre Bay should make the high land of Separation Point, and not bring it to bear southward of S.S.W., which will ensure her passing nearly four miles eastward of the extreme end of Farewell Spit; when the remarkable White Stripe can be made out ($1\frac{1}{2}$ miles south-eastward of Separation Point), and which in clear weather can be seen a long distance outside the bay, it may be brought to bear S. $\frac{3}{4}$ W., which leads nearly two miles from the Spit end, in 25 fathoms. When Mount Burnett bears W. by S. $\frac{1}{4}$ S., the southern edge of the spit is cleared, and a vessel may haul into the bay.

If bound for Tasman's corner, Mount Burnett should be kept on the above bearing until Fossil Cliff bears N.W. by N.; the dry patches on this spit will then be seen about three miles to the northward, and a course may be steered for the anchorage as before directed.

DIRECTIONS FOR VESSELS ENTERING COOK STRAIT FROM THE SOUTH-WEST.—A vessel entering Cook Strait from the south-west with a fair wind, after making the land southward of Cape Farewell, should run along it at a distance of about three miles;* when abreast the cape at that distance,

* A remarkable sand patch shows out at Cape Farewell, on making the land from the westward, which most probably is the sandstone island marked on the chart.—Remarks by Navigating Lieutenant T. H. Tizard, H.M.S. *Challenger*.

a course should be shaped E. by N. $\frac{1}{2}$ N. for 14 miles, when she will be six miles north of Bush-end Point, the high-water extreme of Farewell Spit, and the bushes as well as the lighthouse will be in sight; the course now should be S.E. $\frac{1}{2}$ E. 10 miles—when Separation Point ought to bear S.S.W.—or until the White Stripe is made out and brought to bear S. $\frac{3}{4}$ W., when courses may be steered for either Massacre or Blind Bays. At night—see caution as to red light (p. 122).

If bound through Cook Strait, or for Port Nicholson, pass a convenient distance northward of Stephens Island. D'Urville and Stephens Islands will be seen in clear weather when off the end of Farewell Spit, and generally from a greater distance.

On the outer coast of Cape Farewell it is high water at 9h. 0m., the westerly flood stream commencing at 6h. 8m., and the easterly or ebb stream at 12h. 0m.

FROM CAPE MARIA VAN DIEMEN TO NEW PLYMOUTH.

VARIATION IN 1875.

Cape Maria Van Diemen - 13° 35' E. | Manukau Harbour - - - 14° 10' E.

In completing the description of the west coast of the North Island, it is considered desirable to commence at Cape Maria Van Diemen, the north-west cape, and proceed southward.

Cape Maria Van Diemen is lower than the land east of it. (See description, p. 40.)

CAUTION.—The tides off this cape are rapid, and races are frequent. It is therefore advisable to give the coast a berth of three to four miles. Along the north coast the flood sets to the westward, and on the west coast to the southward. One and a half miles from the shore the tides are generally twice as strong as three miles off.

Pandora Bank, lying six miles S.S.W. $\frac{1}{2}$ W. of Cape Maria Van Diemen, frequently breaks heavily, and sometimes appears like a race, not less than five fathoms has been found. The shoal part covers two square miles, is of hard sand, covered with seaweed. Immediately seaward there is 20 fathoms; between it and the shore is a channel with a depth of 13 fathoms.

Coast to Reef Point.—Six miles south-east of Cape Maria Van Diemen commences the hard sandy beach, which extends in the same direction nearly 40 miles to Ahipara. The small rocky islet Motu Pea, 11 miles from the cape, is about half a mile from the beach, and 100 feet high. There is no channel between.

Monganui is a rocky projection 15 or 20 feet high, connected with the sands at low water, and is $6\frac{1}{2}$ miles from Motu Pea. A range of white sand-hills, varying from 100 to 300 feet in height, extends along this coast. Five miles from the shore the soundings are from 20 to 25 fathoms, grey sand.

Ahipara Roadstead, at the extreme of the sandy beach just mentioned, affords no shelter from westerly winds.

The anchorage is, after bringing Reef Point (Tauroa) to bear S.W.: the soundings decrease gradually from 10 fathoms, fine sand. It is sheltered from south-west and south-east winds; also from north-east, but as the gales from this quarter veer to north-west it would not be prudent to remain. In the small nook (Ongonga) boats can ship cargo.

Reef Point slopes down from hills chequered with sand; a spit of sand which generally breaks extends half a mile westward; there is sixteen fathoms one mile west of the point; the tide, which runs from two to three knots, is imperceptible in Ahipara Bay; $1\frac{1}{2}$ miles south of reef point is a remarkable sandy ravine.

False Hokianga (*Herokino*) is nine miles south of Reef Point, and 16 miles northward of Hokianga River; it is a small and dangerous harbour only available in fine weather for vessels drawing up to six feet; on the north entrance are sand-hills with green patches; from the south head bare hills rise suddenly to an elevation of 800 feet, and continue the same height to Wangape, with a table summit and deep ravines showing seaward.

Wangape, a small port five miles southward of False Hokianga, is used by small vessels in fine weather; it has no bar, but there is a sunken rock in the channel, which is less than a quarter of a mile wide; the tides are strong and set across from point to point, so that a vessel entering with a strong flood tide would inevitably be carried on shore; there is five fathoms in the channel, the northern side of which is the best; a sunken rock (*Mamawa*) is said to exist at the entrance.

The heads are bold, and the land on either side is high, and continues so four miles southward of the entrance, when a sandy beach, backed by sand-hills from 100 to 300 feet high, extends nearly eight miles to the north head of Hokianga River.

Hokianga River is the northernmost port on the west coast accessible to ships of burthen. It flows in a north-easterly directions for 20 miles between the wooded ranges of Waima and Punghuru, from 1,500 to 2,000 feet in height; Maungataniwa, at the head of Maungamuka River, is 2,150 feet high. Hokianga River is navigable, with few obstructions for 15 miles from the heads; the depth in the channel varies from 4 to 26 fathoms, mud and sand, and the water is salt to its source.

Directions for Entering.—In approaching Hokianga River a stranger should be confident of the latitude, for reason of the similarity which exists in some points between it and the small ports to the northward, and the possibility of being thus mistaken in thick weather.

The entrance may be known by the north head being the southern termination of a sandy range before mentioned, while southward no sand-hills are to be seen for a distance of 17 miles, or until passing Monganui Bluff, which is 2046 feet high, falling abruptly to the water 17 miles southward of Hokianga River. On a tolerably clear day it will be seen from the northward or westward long before reaching the entrance of the port. There is no high land like it on the coast; it is a good mark to make when approaching Hokianga or Kaipara.

A constant swell from the westward breaks heavily on the beach, and the bar is almost always breaking (there may be about eight or nine days in the year when the bar could be crossed without a break). Vessels should, therefore, be prepared for shipping a sea; three rollers generally are experienced before the bar is passed.

A vessel should be off the entrance at half flood so as to carry the flood into the harbour; should the first of the ebb have made, and the bar appear passable, it must be borne in mind that there is a tide of five knots to contend against, with the chance of the wind falling, and that the anchorage between the bar and the heads is bad. ("Pay attention to the signals, do not attempt to cross the bar without being signalled to do so. The risk is too great for square-rigged vessels to beat in. Ships can lead in with wind from South—West about—to N.W."—Harbour Master). Attention must be paid to the semaphore arm as the channel shifts occasionally.

The following directions for Hokianga are from the *New Zealand Gazette*, July, 1878, and are given in place of those in the *New Zealand Pilot*, viz. :— "The result of the recent survey shows that the banks or shoals extend as formerly direct across from N.W. to S.E. for two miles, at a distance from $1\frac{1}{2}$ to $1\frac{3}{4}$ miles from the heads, with two channels—the North and the South—in both of which there was no less than 18 feet found at low water springs; while where the former main channel existed, there is only nine feet; thus showing considerable changes since the last survey, for which reasons the beacons for this channel have been removed, and owing to the changeable nature of the bars will not be again erected. The present marks for the north channel bar are—Andrews' Store (the right-hand house on the beach in Martin's Bay) on with the extreme of the south head, bearing E. $\frac{1}{4}$ N., and the low point to the southward on with Monganui Bluff. The marks for the south bar are—the Schoolhouse (a conspicuous white building standing alone on the rising ground to the northward of the old pilot house) on with the extreme of the south head bearing N.E. $\frac{1}{2}$ E. and the low point on—as above—with Monganui Bluff. But, as (already observed) frequent changes take place, vessels are warned not to place too great reliance on the above position of the bars for any length of time, but should trust to the following DIREC-

TIONS for entering :—The south head is 150 feet high, and has a large white signal staff on it, from which the International Code and general signals for all New Zealand ports are exhibited. To the latter, vessels are warned to pay attention, particularly to the semaphore arms, by which all vessels are piloted to the bars and into the harbour as far as where the pilot boards within the heads. It is not advisable to attempt taking the bar, unless with moderate weather and leading wind, and never without the signals being made. The soundings outside suddenly shoal from 8 to $3\frac{1}{2}$ fathoms. A chart of entrance showing present state may be had at the Custom House in the principal New Zealand ports.”

At the entrance between the heads there is a depth of from 16 to 27 fathoms ; two dangers on the north side of the channel narrow it considerably, viz.—the Nine-foot Rocks, and a patch of two feet off the north head.

CAUTION.—The ebb sets directly on the south head spit, and in going out due allowance must be made for clearing it.

Martin Bay is just within the south head, free from dangers, with good holding ground, but generally a considerable swell ; it is therefore better in entering not to anchor until past the Middle Ground, off the White Cliffs. Vessels outward bound anchor here to await an opportunity of crossing the bar.

Middle Ground.—There is a good channel either side of the Middle Ground ; the eastern is the broadest.

Wairohea River.—The foul ground off this river frequently causes a race, the outer ledge dries at springs.

After passing the south head, and when it is brought to bear S.S.W., steer N.E. until Young's Point bears N. $\frac{1}{2}$ E., then for that point until midway between it and the low sandy point Rangī ; then edge over to the westward to avoid the bank south of Young's Point, but not so far as to shut the north head in with Rangī Point.

After passing Young Point, steer for the next point on the same side (Kowwarri). Abreast Mahenna Island four fathoms will be found the least water. Keep a cable from Kowwarri Point, which has rocks off it covered at half tide. When abreast Kowwarri, steer over for Tekaraka Point to avoid an extensive flat between the former and Onoko Point, but when nearing Tekaraka edge away for Direction Head, not approaching within a cable of Tekaraka, as rocks dry off it to the southward at low water.

From Direction Head, the river course in mid-channel is N.E. by E. There are no dangers but the low-water edges of the banks, which extend a short distance without the line of the points.

From Mutawhero Point, which is steep-to, keep Hurd's Point (a long low point) on the starboard bow, to avoid an extensive flat formed by the Omanai River. From abreast Hurd's Point steer for the north point of the Narrows.

Narrows.—To pass through the Narrows, which are deep, a vessel should have a commanding breeze or slack water, as the tides, which occasionally run four knots, set from point to point.

The only danger in the Narrows is the Takataka Rock, just covered at high water, one-third of the way across from the north point of the upper end of the Narrows. It is steep-to from the southward, but there is no channel between it and the north shore.

From the Narrows give the north bank a fair berth, steering for Mototi, a low sandy islet. Below this islet, and abreast Kokohu (Mr. Russell's station), is as high as vessels of burthen can proceed. The width of the deep-water channel here is two cables, and the anchorage is in four to five fathoms.

In working up or down the river, a vessel should not stand within the line of the points, as the mud flats in all the bights extend from point to point, and are invariably steep-to. The Narrows should be passed with a leading wind, unless a pilot understanding the set of the tides should undertake to work a smart vessel through.

CREEKS.—There are four extensive salt-water creeks on the north bank of the river, within seven miles of the head, which need not be further mentioned here.

TRIBUTARY RIVERS.—The tributary streams which empty themselves into the Hokianga River on the north side are the Motukaraka, Maungamuka, Orewa, and Hauraki, the latter a continuation of the Hokianga itself; those on the south side are the Waima, Omanai, and Wirinaki.

These rivers can scarcely be considered navigable for vessels drawing more than six feet, and the channels are generally narrow; about half-way from their source the water is fresh at half tide. Local information can be obtained concerning them, which the scope of this work does not include.

The bed of Hokianga River is for the most part soft mud, except near the mouth, where there is in the middle ground a hard sand bank.

Ordinary springs rise 10 feet, neaps 7 feet; during strong westerly winds, the neaps rise as high, and sometimes, four feet above them; when inside the heads, the velocity of the stream decreases to from two to three knots, until in the narrows, where it is as much as four knots. At the anchorage off Ko-ko-hu it is high water at 10h. 15m.

On the outer coast the flood runs southward and the ebb northward, two knots at three miles off shore, and one knot at twice that distance.

OFF-SHORE SOUNDINGS at 10 miles will be found in about 60 fathoms green mud and sand, decreasing gradually to 30 fathoms within three miles.

WIND.—It blows hardest and most frequently from north-west to south-west; the westerly winds are in about the proportion of three to one. The heaviest gales are from south-west in the month of June. Easterly winds are most common in summer months, and generally draw round by the south; they last about three days.

The greatest quantity of rain falls in the winter months, July, August, and September.

FOGS prevail in October and November, but seldom last more than than three hours, from daylight to about 8 a.m.

FRESH WATER.—Between the heads and Young's point there are fresh-water streams where vessels may water; the most preferable is on the north shore, one mile from the north head.

From Hokianga River the coast continues its south-easterly trend, moderately high; eight miles southward it becomes rocky, with large boulders, and continues so to Monganui Bluff. There is 20 fathoms water, two miles from the shore.

Monganui Bluff has already been described. There is a break in the cliffs (which are topped with sandy hillocks) for two miles southward of it, when they again commence, and extend uninterruptedly in a straight line for 35 miles, or within eight miles of the north head of Kaipara harbour; they are backed by a range of moderate height, which extends the whole distance parallel with the coast.

At the foot of the cliffs the whole way from Hokianga to Kaipara, a distance of 64 miles (except at the base of the Monganui Bluff), is a hard sandy beach.

Eight miles north of Kaipara the sandy cliffs recede inland; the sand hills at the north head of Kaipara are 200 feet higher than those along the beach.

Kaipara Harbour (see Plan) is one of the most extensive inlets in New Zealand, with perfect security within it for any number of vessels of the largest size. The following is supplied by Captain J. McKenzie, late Harbour Master at the Kaipara:—"There are four main rivers, the Wairoa, the Otamatea, the Kaipara, and the Oruawharo; and three smaller ones, Arapaua, Tapora, and Makarau; the former being navigable for many miles for vessels of large tonnage. **KAIPARA ENTRANCE.**—The entrance to the port, owing to the absence of any distinctive features, is not easily picked up by a stranger in the offing. The best guide is to observe that the north head is somewhat higher than any land between it and Monganui Bluff, and ends abruptly in a sand cliff about 500 feet high; and that the south head, which terminates seaward in low sand hills close to the shore, is lower than the north head, with a green triangular tuft—Pukitu—two miles south of the head on a sand hill 430 feet high; also, that in clear weather the dark hills on the eastern shore opposite the entrance can be seen, especially Mount Whaka-huranga, 476 feet high, at the entrance to the Oruawharo River. A

good look-out must be kept from aloft for the breakers on the North Spit and South Shoals, which extend five and seven miles off their respective heads, with the only navigable channel the Kemp—or Galatea—between them, with six fathoms least water on the bar in mid-channel. This channel is about $1\frac{1}{2}$ miles wide at the entrance, on the bar, between the two shoals mentioned above, and some $6\frac{1}{2}$ miles long to, about $1\frac{1}{2}$ miles within the northern entrance point, narrowing to about three-quarters of a mile abreast it, the water gradually deepening, with as much as 23 fathoms off the point. The channel is formed by the northern spit or bank and the southern shoals, near the inner part of which and opposite the north entrance point, is what was formerly known as the Tory Shoal, but which now forms the N.W. part of the southern shoals.

A little to the westward of the highest part of the north head, and close to the edge of the cliff, is the signalman's house, with the signal or semaphore staff—about 100 feet high—westward of it, and a white cone beacon—about 60 feet high—some 500 yards to the eastward of signal staff. As these two (which are the leading marks in) are not readily distinguishable by the naked eye owing to the background of reddish sand, it will be necessary—before picking them up—to bring the north head as near as possible on its proper bearing, viz., N.E. $\frac{1}{2}$ N., before nearing the breakers; a guide to this is the Mount Whaka-huranga (above mentioned) which can readily be distinguished, opening the north head at N.E. $\frac{1}{2}$ E. As soon as the signal staff and beacon are made out, bring them in one N.E. $\frac{1}{2}$ N.—observing that when Pukitu Tuft (above mentioned) bears E. by N. you will be close on the bar—and steer in on this course, keeping them in line, and watching for any directions from the semaphore arms, which however will not be used so long as the channel is kept. When abreast the low sandhills at the northern entrance-point, steer along the north shore from two to three cables off until abreast the signal-station, and thence from a quarter to half a mile off shore until abreast the pilot-station on Pouto Point, which is some six miles from the outer low sandhills, and may be said to be the inner north head; keeping a look-out for the pilot, who will board as soon as practicable. But in the event of no pilot being at the station good anchorage can be had about one mile to the northward of Pouto Point, in from five to fifteen fathoms from a quarter to half a mile off shore, abreast a native settlement. Beyond this, a pilot is necessary. If bound to the southern or Kaipara branches, and not boarded by the pilot before getting up to the lower *red* buoy, which marks the tail of the Tepora Flats—nearly in mid-channel abreast the lagoon on the southern shore—pass this buoy and the *black* one, which lies about a mile to the eastward of it on the south side of the flats in three fathoms, on the port hand, steering towards the south head (red and cliffy, with cultivations on the top), which may be passed two cables' length off. Then follow the southern shore (which is high, with cultivated cliffy hills) for about two and a half miles, until abreast the first projecting point—Kawai Point—when anchorage can be had in seven to nine fathoms. Be careful not to proceed above this point any distance, as there is a bank in nearly mid-channel with from one to two fathoms on it, one mile above the point, with a beacon on its lower end. Wait here till the pilot comes across from Pouto Point—generally in a steam launch. Beyond these two anchorages—viz., above Pouto Point, on the north side, and off Kawai Point, on the south side—is strictly pilotage waters, and no further sailing directions need be here given.

Large vessels bound up the Wairoa River (where at present the principal industry is timber) to the mills, which are some 35 miles above Pouto Point, will require a leading wind, but smaller ones up to 300 tons can work all the way up or down on the tides. There are at present two small steamers which can be had on application for towing at reasonable rates. Vessels load sawn timber at the wharves, where there is eight or nine feet at low water, soft muddy bottom; those taking in logs usually moor abreast in the river, the deepest water being abreast the Te Kopuru mill, where they can lie afloat at any time of tide, drawing up to 18 feet. Vessels requiring to refit, etc., can obtain spars, stores, and provisions at reasonable rates. There are good shipwrights resident, and vessels up to 150 tons have been built here. The town of Dargaville lies above the upper mills, and is with the

whole district rapidly increasing in importance. Vessels of 130 tons have loaded twelve miles above Dargaville. The Otamatea River penetrates a long way into the interior in a northerly and easterly direction, to within a few miles of the head waters of the East Coast rivers, and is navigable for vessels up to 500 tons; the least depth is four fathoms at low water. There are extensive forests at its head, and the adjoining district is chiefly grazing and agricultural. The Arapaua River branches off to the north-westward from the Otamatea about four miles above its entrance, is navigable with a deep and straight channel for five miles for vessels of any size, having six to nine fathoms in its channel; the district presents the same features as the Otamatea. The township of Batley is situated at the junction of these rivers. Steamers ply on these three rivers bi-weekly to Helensville at the head of the Kaipara branch, connecting there with the railway to Auckland. The Oruawharo River lies to the S.E. of the entrance to the Otamatea, is navigable for large vessels some six miles, and for coasters some ten miles farther up to the saw mills at Tapuni. The Albertland Settlement is on the south-eastern side of this river, with the town of Port Albert ten miles from the entrance.

The Taporu Channel lies to the N. Eastward of the south head, and runs in an E.N.E. direction, with an average width of half a mile for about eight miles, carrying a depth of seven fathoms to Orongo Point, where it shoals to four fathoms. Large vessels should not proceed more than one mile above this to Te Karaka Point. Hence the river takes a northerly and N. Easterly direction, and becomes narrow, only fit for small vessels of 20 or 30 tons. The district at the head of the river joins the Port Albert settlement, and has large kauri forests.

The Kaipara River extends in a S.E. direction from the south head to its junction with Makarau Channel 11 miles; thence in a more southerly direction for about two miles to Aotea or Shelly Beach, where the channel is half-a-mile wide, with from ten to five fathoms water, and close to the point. There is anchorage here with good holding ground. Large vessels should not proceed above this, unless in tow, the water shoaling and the channel narrow and intricate to Helensville, a distance of about 14 miles from Shelly Beach. The Makarau Channel (leading to the river of the same name) branches off from the Kaipara River (see above) in a N.E. direction. Vessels drawing 14 feet when loaded, can go five miles up to the loading ground within the river. Large quantities of kauri timber are shipped annually from this place.

In the channel from the bar to abreast the signal station the tides run during freshes in spring tides fully seven knots, in ordinary springs five, and in neaps, four knots. After rounding Pouto Point the springs in the Wairoa River run over four knots; neaps, three.

In the Kaipara Branch, up to the first anchorage, the springs run three knots, above that not more than two. The tides of the rivers follow the courses of the channels.

It is high water at the upper mills at Aratapu at 1 p.m., F. & C., rise—springs 12, neaps 8 feet.

The tides outside follow the direction of the coast, the flood running south and the ebb north, but on striking the outer banks they flow and ebb directly over them, as well as through the channel. This set of the tides must be attended to in navigating the channel, and a vessel should not stand far into the great semi-circular bight inside the banks with the ebb or she will be carried on them. Unless in cases of emergency vessels should not anchor outside the heads. Vessels anchored above Pouto Point can easily beat out with a good working breeze, and get a good offing in one tide by starting at slack water at the beginning of the ebb. The best tides for this are when it is high water, about 10 or 11 o'clock, as the sea breeze will then have set in.

CAUTION.—If a fair wind is considered necessary, it must be remembered that the morning land wind will rarely carry a vessel clear of danger, and will probably leave her becalmed among the breakers. "Masters of vessels should be careful, coming in or leaving with light winds, as they sometimes fail when most required, and the strong tides invariably set a vessel on to the North Spit, if the anchor is not let go in time. With a com-

manding breeze there is no danger, if the leading marks are kept on."—Harbour Master.

From Kaipara to Manukau Harbour, a distance of 40 miles, is almost a straight coast, free from dangers; no landing can be effected on any part of it. Rangitera Beach, a hard sand fringed with low undulating sand hills, extends 24 miles south of Kaipara; two miles inland, a range of barren hills, many of them with sandy tops and faces, runs parallel with the coast, the highest not exceeding 550 feet.

The small island Oaia lies at the southern end of this beach, half-a-mile off shore; hence to Manukau Harbour the coast is rugged and cliffy, broken here and there into sandy bays and beaches, the land rising gradually towards the north head. The cliffs for five miles northward of the entrance are from 600 to 800 feet high; two miles from the north head is a remarkable conical peak (Ohakö) close to the sea. $1\frac{1}{2}$ miles north of Ohakö is Parera, a small rock, half a mile off shore. The coast immediately southward of Parera is fronted by a shoal, which extends one mile off, continually breaking. The north head itself is a remarkable cone, and has two others inside it a distance of half-a-mile from each other.

Vessels running along the coast from the northward for Manukau should keep four miles off shore until the marks are on for entering, as the banks extend three miles off the mouth of the harbour.

Manukau Harbour.—This extensive inlet is immediately opposite to Auckland Harbour (see Introduction).

CAUTION.—Since the survey by Captain Drury, R.N., in 1853, it has been found that the channels and banks have considerably altered, and attention is here called to the fact that the main channel—formerly so called—is no longer used; for directions, see those following by Captain Wing, Harbourmaster.

Situated, however, as Manukau Harbour is, on an open and exposed coast, with shifting banks, at the distance of three miles from the land, the harbour has so many dangers as to make it imperatively necessary for attention being paid to the latest local directions, and the greatest precaution being observed by the mariner. No one unless thoroughly acquainted with the local signals should attempt to enter the Manukau Harbour without a pilot; the lead should be kept constantly going.

The following is supplied by the Harbourmaster, Captain T. Wing, viz. :—

“ENTRANCE.—The heads are easily distinguished, the coast gradually increasing in elevation from Kaipara to Manukau, where the hills on the north shore rise to the height of 1,280 feet. To the north of the port the country is an extensive forest, while all that facing seaward to the southward is peculiarly barren for 20 miles. But the most conspicuous objects first visible from the westward are three conical peaks near the north head. One of them forms the island Paratutai, and may be considered as the north head, being connected by a causeway. It is 350 feet above the sea. The south head presents a rounded barren face of brown soil, with table land extending southward, and is one mile inside the line of north head. About three-quarters of a mile from the North Head, inside the harbour, are three beacons, which when kept in one are marks leading along shore, to or from the turnings of the Fanny or South Channel, the only ones by which vessels are now signalled from the South Head. The tides are strong, and have a tendency to set over the shoals, which in a measure causes the channels to shift either to S.E. or N.W., but as a rule they do not shift suddenly. The Fanny Channel, generally, has only about two fathoms water in the centre at low tide, and the South Channel sixteen feet, yet in most cases there is less sea in the Fanny Channel than in the South during strong westerly winds. Care must be taken when approaching the Emma Bank, as the soundings decrease very quickly to six or eight feet at low tide. The two beacons on South Head are placed on slidingways, leading a fairway from sea for the South Channel; but not always direct through in consequence of the Treachery and Tranmere Shoals sometimes overlapping. [‘The beacons on South Head do not now lead in the deepest water, therefore until further notice, pay particular attention to semaphore.’—N.Z. Gazette, June, 1880.] Therefore masters of vessels when entering or leaving the harbour should pay

particular attention to steering the vessel in the direction the semaphore arm (on signal-mast) points, and steady the helm the moment it drops. The South Channel buoys have been removed, being no longer required. Vessels making for the South or Fanny Channels should bring the South Head to bear N.E. by N. $\frac{1}{2}$ N., keeping on that course until the signals are made out. The course then should be as directed by the semaphore arm until the three beacons on north side of the harbour are brought in line (bearing N. by W.) Then haul sharply to the northward, keeping North Shore beacons in line until the harbour is well open to clear the South Head Spit and Emma Bank. The pilot, if necessary, will board inside the entrance. Should there be no pilot, and the vessel bound to Onehunga, keep red buoys on starboard and black on port hand. Care should be taken to guard against the cross tides about the spit and swathways. Four leading marks (painted white) have been erected on the South Head to lead the course of the Fanny Channel. Bearing (in line) N.E. by N., having two and a half fathoms water in mid-channel at low spring tides. It is also to be observed that the above-mentioned leading marks are nearly in line with the signal mast, and are placed about 300 yards north of the two leading beacons for South Channel. High water at the Heads on the full and change of the moon, 9.30 a.m. rising twelve feet at springs and nine feet at neaps. At Onehunga, 10.20 a.m., strong N.W. winds frequently raise the tide to 15 feet at the wharf. The tides are strong, particularly about the Heads, running from five to six miles per hour at half tide during springs. A gale from N.W. or W. does not cause a heavy sea in the South Channel until the wind shifts to S.W., which change (as a rule) seldom lasts over a day and a night; but, should the wind back to the westward, as it sometimes will in the winter season, the sea and weather will continue to be unsettled. The prevailing winds are from the westward. It seldom blows a gale from the southward. Easterly gales are not frequent, and they generally shift to N.W. with a hard squall, accompanied with heavy rain, working to the westward with a rising barometer. A falling barometer indicates a change to the north with rain; but when the barometer rises above 30 inches (say about $30^{\circ} 30'$), and the land appears nearer than usual, expect a change to the eastward. A clear, cloudless night also is an indication of a change being at hand, and if accompanied with heavy dew the change will in most cases come from a north-east quarter, but when lightning is seen to the westward, in the dark, cloudy weather, you may expect a blow from about S.W.

“MANUKAU HEADS LIGHT.—A fixed white light is now exhibited from a tower on the brow of the bluff, forming the south side of the entrance to the harbour bearing from Paratutai E. $11^{\circ} 15'$ south, distance $1\frac{1}{2}$ of a mile. The tower is 20 feet high, and the light 385 feet above the sea level, and visible from seaward in clear weather at a distance of $26\frac{1}{2}$ nautical miles, between the bearings of N. by W. $\frac{1}{4}$ W., nearly, and E. by S. $\frac{1}{2}$ S., a very narrow arc of light will be obscured by top of Paratutai where the light bears E.S.E.”

CAUTION.—In thick weather great care should be taken in approaching the shoals, which extend so far from the Manukau entrance. Care must be observed when drawing near Tranmere shoal not to open the South Head beacons southward.

After passing the South Head spit the channel is clear to Puponga, a distance of five miles, the depth gradually decreasing from 20 fathoms; it is not advisable to anchor before rounding this point on the north shore, or Mako Point, nearly opposite it on the south side; but if necessary, the Huia banks afford anchorage in five to six fathoms, two miles below Puponga. Shoal water extends off the Huia for one mile westward of Puponga, by keeping the Nine Pin open of Paratutai the outer edge of it will be cleared.

After rounding Puponga Point, vessels bound up the northern or Wai-ropa Channel should haul up to avoid the tail of the mud flats—marked by red buoys—between which and Puponga there is a channel of scarcely half a mile; good anchorage will then be found in four fathoms, half a mile above the point, and about a third of a mile off shore; with a leading wind vessels can proceed as far as Shag Point, five miles above Puponga, leaving the red buoys on the starboard hand, the channel being a third of a mile wide, and the course along the coast, taking care not to get within the line of the points.

Vessels going to Papakura or Waiuku should proceed to an anchorage, off Kauri Point, in from 8 to 10 fathoms. The course to this anchorage, which is little more than two miles from Mako Point, is, after passing the latter to keep the shore on board within a third of a mile, to avoid the flats, which dry at low water. Should a vessel arrive off Paratutai and be unable to obtain a pilot, the best place to anchor is half a mile above Puponga Point, where he would be seen from Onehunga and a pilot would come down.

Tides above Puponga, both in the Wairoa and Waiuku Channels average $2\frac{1}{2}$ knots at springs. On the outer coast the flood sets to the south and the ebb to the north. The tides within take the direction of the channels. Vessels should not attempt to enter Manukau Harbour against the strength of the ebb, unless with a commanding breeze. The soundings from seaward decrease gradually.

SIGNALS.—The following local signals for Manukau Harbour (prepared by Captain Wing) are approved by the New Zealand Government, and supersede those formerly in use :—

- | | | | |
|--|--|--|--|
| 1. One ball at mast-head—
<i>Wait for flood tide.</i> | | 8. Both semaphore arms pointed down— <i>No wind about the Heads.</i> | |
| 2. One ball at mast-head, and North semaphore arm pointed up— <i>Wait for half flood.</i> | | 9. North semaphore arm pointed horizontally, and South arm downwards— <i>Come to an anchor.</i> | |
| 3. One ball at mast-head, with both semaphore arms pointed up— <i>Wait for high water.</i> | | 10. Both semaphore arms pointed upwards— <i>Remain at anchor, or Wait for Signal.</i> | |
| 4. One ball at each yard-arm— <i>Steam vessel, take South Channel.</i> | | 11. South semaphore arm pointed upwards, and North arm downwards— <i>Will send a Pilot.</i> | |
| 5. Two balls vertical at South yard-arm, and one at North yard-arm— <i>Sailing vessel take South Channel.</i> | | 12. Both semaphore arms pointed horizontally— <i>Get under weigh.</i> | |
| 6. When the ball at North yard-arm is lowered half-way down in connection with signal for steam or sailing vessel, it will mean <i>Take Fanny Channel.</i> | | 13. North semaphore arm pointed up, and one ball at North yard-arm— <i>A vessel in danger and wanting assistance.</i> | |
| 7. One ball at mast-head, and one at each yard-arm— <i>Bar dangerous.</i> | | 14. Both semaphore arms pointed up, and a ball at each yard-arm— <i>A steamer is coming to your assistance.</i> | |
| 16. The semaphore arms will be used for piloting vessels in and out of the harbour when required. The vessel being piloted by the semaphore is to be steered in the direction in which the semaphore arm is pointed; and when the arm is dropped, the vessel is to be kept steady as she goes. | | 15. When the signals are intended for vessels OUTWARD BOUND an extra signal in the form of T, painted red, will be shown below the yard on the mast. | |

NOTE.—*The Illustrations are shown as they will appear from seaward.*

INNER WATERS OF MANUKAU HARBOUR.—From the Puponga Peninsula, Manukau Harbour expands to a breadth of 15 miles by 12, with three channels navigable for vessels of burthen to the three districts Onehunga, Papakura, and Waiuku, to which one tide will carry vessels, with leading winds. The extensive flats are generally covered soon after the first quarter flood, and some never uncover. These channels are with slight exceptions nearly straight, and having dry banks on either side at low water, they offer a sheltered anchorage in any part; they carry their depth up to within the heads of Waiuku and Papakura, and nearly up to Onehunga.

ONEHUNGA middle or main channel leads along the north shore from Puponga Point; a flat extends from the village of Karangahape, which lies in the bight, $1\frac{1}{2}$ miles north of Puponga.

From Karangahape there is a straight channel to Shag Point (Okewha) one-third of a mile broad, with $4\frac{1}{2}$ fathoms at low water.

At Shag Point the channel divides. The inner one along the coast has a depth of three fathoms near the Waiuku Portage, but is difficult at Cape Horn.

The main channel takes an easterly direction from the buoy off Shag Point to the next buoy; thence turning in again towards Cape Horn. Its width is little more than a cable, with from three to four fathoms at low water. At the junction of the three branches near that cape, the least water is 13 feet. The starboard hand of the channel here is well marked by beacons.

CAPE HORN (Matengahe) $2\frac{3}{4}$ miles below Onehunga, is steep-to. The anchorage above it is wider than that immediately off the lower end of Onehunga, where there is, however, a pool of three fathoms at low water. The general anchorage would be about a quarter of a mile below the white cliff (Tetapere), in 18 feet at low water. Vessels should moor.

ONEHUNGA is a port of entry about six miles south of Auckland by land (see introduction), and has now extensive wharf accommodation.

Purakau or the outer Onehunga channel runs from Puponga Point, between the banks, straight for Puketutu Island. It has an average width of a quarter of a mile, and carries from six to seven fathoms at low water to within three-quarters of a mile of that island. It then takes a direction for Cape Horn, and becomes narrower and somewhat intricate. At its junction with the middle channel at that point there are only nine feet at low water.

Papakura Channel, cutting through the middle of the flats, runs to the eastward for 12 miles. It has from 8 to 10 fathoms for the first three miles, and not less than four fathoms to within the heads, where there is anchorage in $4\frac{1}{2}$ fathoms.*

Waiuku Channel, commencing from Te-Hono Point, opposite to Puponga, runs along the shore southward. For six miles there is from five to eight fathoms water until nearing the heads (Karaka and Tokaroa Points), when the depth decreases to four fathoms.†

The channel leads close to Karaka Point, a reef and bank extending a considerable distance off the opposite point; there is a hole of 17 fathoms between, and six fathoms after passing them, in which depth there is anchorage one mile within.

Above Karaka Point the river runs to the south-east, and vessels drawing 12 feet may go $4\frac{1}{2}$ miles up to the narrows.

The Taihiki, a tributary of the Waiuku, one mile within Karaka Point, is navigable for vessels drawing 12 feet for two miles.

The Coast from Manukau to Waikato River, 22 miles in a S.E. $\frac{1}{2}$ S. direction, is a sandy beach, with barren-looking tableland facing seaward.

Waikato River takes its rise about the centre of the island in Tongoriro Mountain; it is one of the largest rivers in New Zealand, but has a shifting bar entrance, rendering it only available for small vessels; it is said to be navigable for vessels of 30 tons for 60 or 70 miles. There are $3\frac{1}{2}$ fathoms within the entrance. The town of Mercer at Point Russell is some

* Extensive coal fields have been discovered at the head of this channel.

† A pinnacle rock is said to exist midway between Karaka and the opposite shore of the channel, but we searched for it in vain.—Remarks by Captain Drury, R.N.

25 miles from the entrance. Here the railroad from Auckland passes close by the river banks, and on to Ngaruawahia (Newcastle), where it crosses the river over a substantial bridge, and on by Hamilton, etc., southwards. At Ngaruawahia the river divides, one branch—the Horotiu—running past Hamilton and Cambridge; the other—the Waipa—past Alexandra. Steamers ply between Mercer and these towns. Coal mines, near the banks of the river at Taupiri, etc.,—some 20 miles above Mercer—are being rapidly developed, aided by the railroad communication with the Manukau and Auckland. The north entrance point is composed of sand-hills, while the land on the south side is bold, rising from 500 to 600 feet; a mountain 1,230 feet high (*Terua-tui-tui*) lies N.E. by E. $4\frac{1}{2}$ miles from the entrance.

BEACON.—Two white beacons have been erected on the north bank; they are 25 feet high and 200 feet apart; when in line, they lead over the deepest part of the bar.

DIRECTIONS.—When near the Waikato do not shut in Oruarangi Point (three miles southward of the entrance) until the Fairway beacons are in one, bearing N.E. by E. $\frac{1}{2}$ E. Easterly; then proceed over the bar with them in line. When just over the bar, the water will deepen five or six feet; keep the marks on until a sandy cliff on the south head is about to shut in, when steer for Putataka. When the mission house is touching a yellow cliff on the west side of Putataka, see that the small black beacons are still open, to avoid the five-foot bank to northward of channel.

If wishing to bring up eastward of Putataka, anchor so as to swing clear of a 4-foot rock, E. by N., one cable from the point, and the shoal water northward of the channel. If the vessel is 150 feet long she must moor, but can lie at single anchor to the north-west of the point. The tide is less strong to the eastward of the point.

In going out from Putataka, steer for the mouth of the river, keeping the black beacons open to avoid the 5-foot bank.

The least water on the bar, with the Fairway beacons in line is 12 feet 6 inches at low water spring tides; but there is 10 feet a short distance northward, and 11 feet southward, so that the marks should not be opened much.

The beacons when in line appear on with the middle of an easily recognized gully.

The Eastern beacon is on White Shell summit; the Western beacon a quarter of a mile S.W. by W. $\frac{1}{2}$ W. from it on a little mound.

The spits at the entrance appear to have shifted since Captain Drury surveyed the Waikato, as the present Fairway magnetic bearing differs nearly half a point from the old one.

The Coast.—From Waikato River the coast trends S.S.E. $\frac{1}{2}$ E. 20 miles to Whaingaroa Harbour; the only off-lying danger is the Kapiapia rock, a black rock about 20 feet high, lying one mile off the coast, 7 miles southward of the south head of Waikato. The points are generally clifty, with scattered rocks extending about a quarter of a mile off them, and sandy beaches between.

The land is moderately high and undulating 300 to 600 feet above the sea.

SOUNDINGS off this part of the coast are, at the distance of 10 miles, 28 fathoms, gray sand, shoaling gradually to 16 fathoms within four miles.

Whaingaroa Harbour (see plan) or Port Raglan may be known by Karehoe Mountain, of conical shape, rising immediately over Woody Head, the outer south entrance head, to a height of 2,370 feet; an excellent landmark.

The harbour is a bight just northward of the mountain. When the bight is made, the entrance will be distinguished by a reddish cliff hill over the south head; the north head is low and sandy, with high woody land behind; the south point is also low, but not sandy, and slopes down from the reddish cliff hill.

The bar is a mile outside the entrance, which is formed by two spits dry, nearly half way out at low water, the passage between them being two cables wide; the marks for crossing it were, in 1866, a large white house in the town, its own breadth open of Rangitoto Point, or the two beacons on Ann Point in one, which lead in on an E.N.E. course, these marks lead over

the bar in three fathoms at high water. Ann Point gradually slopes from a low hill $2\frac{1}{2}$ miles inside the entrance.

The beacons, *red*, one higher than the other, are posts with barrels on them.

CAUTION.—“The bar and channel were found by H.M.S. *Eclipse* in 1866 to have shifted further north. The two beacons in one on Ann Point lead over the bar in deepest water.”—Marine Department, New Zealand. The brig *Polly* was nearly lost in 1857 by following the then directions. It is evident, therefore, that the entrance must be approached with caution by strangers.

SOUNDINGS.—In approaching Whaingaroa, the water shoals regularly from eight fathoms, two miles off, to nine feet, which is the least depth on the bar at low water springs; the channel is straight in from the bar to the heads, carrying in two to five fathoms when between them. Vessels may sail up to where the harbour branches off into the Whaingaroa and Waite-tuna Rivers, three miles from the entrance.

A course rather northward of mid-channel should be steered until nearly abreast Ann Point, when a vessel should haul over slightly towards the south shore, to avoid a shoal which extends from the north side between Mata-wheno and Mata Kokaku Points.

ANCHORAGE.—There is good anchorage off Mata Kokaku Point, above the greatest strength of the tides; indeed a vessel may anchor in any part of the harbour. Small vessels generally anchor off the first limestone rocks above the north head, near Houe village, in nine fathoms.

The strength of the tides between the heads is from four to six knots. A mile above, from $2\frac{1}{2}$ to 3 knots; and at the anchorage of Mata Kokaku point, from $1\frac{1}{2}$ to 2 knots.

Gannet Island, a small island half a mile round, white with guano, and 70 feet high, with rocks extending a quarter of a mile south-west of it, bears S.W. $\frac{1}{2}$ S. $13\frac{1}{2}$ miles from Woody Head, N.W. $\frac{1}{2}$ W. $11\frac{1}{2}$ miles from Albatross Point, and $11\frac{1}{2}$ miles west of Aotea Harbour entrance. There are 30 fathoms water at the distance of one mile all round, and 20 fathoms mid-way between it and the coast.

Aotea Harbour (see plan on sheet chart).—From Woody Head the coast trends nearly south. The country hilly and wooded. Aotea harbour lies $10\frac{1}{2}$ miles southward of Woody Head, and eight miles north of Albatross Point.

Approaching from seaward the entrance, three-quarters of a mile wide, makes like a great gap, with sandhills on either side. The south point, Kapua-te-manua, has a darker summit than the rest of the hills on the coast, and is 380 feet high. The North Head is a low point, 44 feet in height.

OUTLYING ROCKS.—Off the north head, one mile from the land, are two rocks, the northern (Ewhatu) awash at low water, and nearly always breaks. It bears from the north head W. $\frac{3}{4}$ N., from the bar N.W. by N. $1\frac{1}{2}$ miles from either. The south rock, which seldom breaks, is a quarter of a mile south of Ewhatu. There is deep water round and between them.

THE BAR.—From the north head a long sandspit, dry at half-tide, runs southward one mile. Half a mile southward of the south head the south spit runs off and outlies the north one, drying at low water about one-third of a mile out.

DIRECTIONS.—Steering for the bar, two small triangular patches of yellow cliff to the right of the south point will be seen. The right hand one in line with where the summit of the dark hill over the south head meets the sandhill, E. $\frac{3}{4}$ N., leads over the bar in 11 feet at low water. After crossing the bar, which is about a cable in width, haul in along the spit E.S.E. until abreast the tail of the north spit, which always shows, then gradually haul up, keeping the north spit on board, to the north head. Still keep the north shore on board at $1\frac{1}{2}$ cables distance, as there is an extensive sand-flat on the south side.

When abreast Punga-punga point, edge over to the southward half a cable to avoid a tongue with four feet on it; and when abreast the abrupt termination of the sand on the north shore, steer for the red cliffs on the south side, and anchor off them in from four to six fathoms.

The depth of water in the channel from the heads to Punga-punga Point is from two to four fathoms at low water. It continues eastward three-quarters of a mile towards the white bluffs, when it turns to the northward and divides into three small channels, the westernmost leading to the Mission-station, the middle towards Pakaka Creek, and the eastern to Makamaka Creek.

Between the heads the tides run from three to five knots, and at the anchorage off the Red Cliffs from two to four knots.

Kawhia Harbour (see plan), five miles south of Aotea Harbour, is the most considerable inlet on the west coast south of Manukau Harbour.

The approach is well marked by the distant mountains of Pironghia, which rise in notched summits, 15 miles inland, to the height of 2,800 feet, and by the bold craggy land of Albatross Point to the south, which extends five miles to the westward of the port, and forms the bight in which it lies.

The harbour bears from Gannet Island E.S.E., 13 miles distant. The bar is $1\frac{1}{4}$ miles W.N.W. from the heads. There are two channels in the north and south, separated by a bank nearly half a mile in extent, with less than a fathom on it at low water.

The south channel, the best and deepest, is nearly two cables wide, with 14 feet in it at low water; the northern is less wide, with 11 feet in it; in westerly winds there is a heavy beam sea in crossing it.

The south head is double, with two distinct cliffy points a quarter of a mile apart, and a sandy bight between; rocks extend off both, visible, and not detached: the inner head, which appears as and is called the south head, is 110 feet high, with a very conspicuous yellow patch on it. The north head is a low sandy point.

SOUTH CHANNEL.—Steer for the Pironghia Mountains until Albatross Point shuts in the land southward, which will be about five miles from the shore. Then bring the south head to bear E.S.E., and steer for it until a nearly square white cliff (a little southward of an arched cliff, formerly the leading mark, but now overgrown with scrub) is brought between south head and the large rock off it, E. by S., $\frac{3}{4}$ S., which will lead in over the bar in 14 feet at low water. Then haul up towards the north head to avoid the south bank which the channel leads close to, deepening to $3\frac{1}{2}$ fathoms, when steer direct between the heads E. by S. $\frac{1}{4}$ S., and when two cables beyond the inner south head, or when the outer south head is just open of the extreme of the rocks off the inner head, haul up the left channel, E.N.E. towards Leathart Point. The channel for the first mile between sand-banks is little over a cable wide, with four and five fathoms; the banks distinguished by the stream have only two or three feet on them at low water. After passing them, half a mile below Leathart Point, steer towards that point; there are six fathoms within half a cable of it; anchor half a mile above, a cable off shore, in four fathoms, abreast the native church. There is anchorage in the southern arm for small vessels, by rounding the south head at the distance of less than a cable, and keeping along the south shore for about half a mile.

When the tide is out, the channels leading to the rivers Oparau Awaroa, Rakau-nui, and Wai-haerekiki are plainly visible, and easily navigable for small vessels for a considerable distance.

The tides between the heads run four to six knots; within, from two to four; the ebb sets over on the south spit, with a slight inclination southward; the flood in the contrary direction.

In the bay between the south head of Kawhia and Albatross Point, there is anchorage in four to eight fathoms, sand, in fine weather with off-shore winds.

Coast Southward of Kawhia.—Albatross Point is 600 feet high, bare and cliffy to seaward, with detached rocks within a cable; during south-west winds, and with the ebb tide, there is a great sea off this point; vessels to or from Kawhia should give it a berth; between it and New Plymouth, 70 miles of coast, the small rivers Mokau and Waitara, eligible for coasters in fine weather, are the only places of shelter.

For 18 miles the coast trends south, with a slight curve to Terua Point, which is 400 feet high, and from the northward shows as a light yellow cliff

some scattered rocks extend a short distance off the points, but no dangers are known to exist within one mile of the shore.

TOKAMA-PUNA ROCK, awash, lies $\frac{3}{4}$ a mile off the Marakopa River, 12 miles south of Albatross Point, and nearly one mile north of Terua Point, is a reef awash. Whareorino Mountain, 2,074 feet high, rises over this point, the land over the coast one mile north of it is 1,000 feet high.

SOUNDINGS.—15 miles off shore there are 40 fathoms grey sand, decreasing regularly to 34 and 26 fathoms 10 and 5 miles from the land.

From Terua Point the coast is almost straight to Mokau River, 19 miles from it, and 35 from New Plymouth.

Mokau River takes its rise in the Rangitoto range, and is used by coasters; it has only two feet water over its bar at low-water springs, and at high water 14 feet: vessels of 20 tons cross it under favourable circumstances; there is good anchorage within: it is subject to heavy freshes. Coal and limestone are found here. The village is on a small sandy flat on the north bank of the river, shut in from the sea by a hill.

The Coast from Mokau runs S. by W., 20 miles, when it suddenly takes a westerly trend towards the roadstead of New Plymouth and Cape Egmont. Southward of Mokau it is composed of yellow sandstone cliffs, about 100 feet high.

The White Bluff (*Parini*), a remarkable cliff 900 feet high, visible a long distance from seaward, lies ten miles south of Mokau River.

From Pari-okari-wa, a projecting point two miles southward of this bluff, a long reef extends for two miles to the northward, and breaks only in heavy weather.

Between the rivers Mokau and Waitera there are several streams, most of them fordable at low water.

Waitera River is about nine miles north-eastward of New Plymouth, and is often run for by coasting vessels on the approach of bad weather at that roadstead.

The following directions for the Waitera—where the trade has latterly increased very much—are by Captain Holford, Harbourmaster, New Plymouth, viz. :—

“There is a shifting bar entrance, with sometimes one and sometimes two channels, the northern being principally used. H.W. F. & C. on the bar at 9h. 45m.; depth in main channel at low water springs, about two feet; range, 7 to 12 feet. A vessel drawing nine feet can lay afloat (within) at all times on the east side, opposite the stockyard. The flood runs 2 to 3 knots, the ebb 3 to 4 knots in the entrance; along shore the flood runs eastward, the ebb westward, one to two knots. Shoal water extends with rocky bottom half a mile off shore on each side of the Waitera bight. The flagstaff, with yard and semaphore arm, is on the south side of the river. Masters of vessels are requested to pay particular attention to the signals, and to alter course promptly in the direction to which the semaphore arm is pointed; when it is dropped, keep steady as she goes. The following special night signals are used, viz. :—

“FROM THE SHORE.

“Two *red* lights vertical—Take the bar.

“Two lights vertical, *red* over *white*—Bar dangerous.

“FROM VESSEL.

“Two *white* lights horizontal, with one *red* over, forming a triangle—Want to come in before daylight.

“NOTE.—In all signals described in the General Regulations, and in these special signals, as to two lights vertical (of whatever colour) the two lights will be so arranged as to serve for leading lights,—the upper light being on the flagstaff, and the lower at some distance in front of it. At the Waitera the two lights will appear vertical when the centre of the channel is in line with the flagstaff, the post carrying the lower light being shifted as the channel shifts. The ordinary signal ‘Wait for daylight’ (*white* over *red*) will be kept up when vessels are expected or seen approaching. Vessels approaching at night, in want of pilot, and wishing to enter before daylight, should fire a gun, and burn blue lights if possible, to secure attention. The signal ‘bar dangerous’ means either that the bar is rough or that a strong

fresh is running out. The signal 'Take the bar' will not be shown except in answer to a signal from vessel 'Cannot wait' or 'Cannot keep to sea,' unless there is reason to expect very bad weather before morning; then it will be put up as soon as the bar is fit to take: but masters of vessels must in all cases use their own judgment as to whether they will come in by night or not. When the signal 'Cannot wait' or 'Cannot keep to sea' is made from a vessel approaching at night before the tide serves for the bar, it will be acknowledged by covering the lower light of the signal which is up at the flagstaff, for a short time. The signal 'take the bar,' will then be made as soon as the tide serves; but if there is great risk in coming in the the signal, 'Bar dangerous,' will be made immediately before 'Take the bar,' and the two together will mean that the tide is right, but the bar is unsafe.

"CAUTION.—No vessel should approach at night within a depth of ten fathoms, which will be outside the points of the reefs. In heavy S.W. gales no vessel should approach the Waitera. In fine weather, vessels drawing 9 feet 6 inches may enter on spring tides. Vessels drawing 7 to 8 feet may enter habitually without difficulty.

"DIRECTIONS.—Approaching from the north—bring Mount Egmont S. $\frac{1}{2}$ W., and steer on that bearing till White Bluff bears N.E. by E., when the Flagstaff will bear S.E. by S. $\frac{1}{2}$ S. about two miles, thence for the Flagstaff to the anchorage, three-quarters of a mile off shore, when the outer Sugar Loaf (New Plymouth) will be in line with the western point of Waitera Bight (Kate Point), when there will be six fathom sand, and a vessel may anchor with safety, unless otherwise directed by the signal master. From the south—When abreast of—and a quarter of a mile distant from—the outer Sugar Loaf, steer N.E., till the Waitera Flagstaff bears S.E. by S. $\frac{1}{2}$ S., when as above.

"CAUTION.—The Seal Rock (the westernmost of the Sugar Loaf group) should on no account be opened south of the outer Sugar Loaf, till the Waitera Flagstaff bears S.E., which will clear the roll on the Puketapu Reef. A Harbour Master and Pilot has been appointed at the Waitera, but a pilot can be taken on board at New Plymouth if desired."

TIDES.—The flood stream from the northward meets the flood stream from Cook Strait in the vicinity of Gannet Island, about 80 miles to the northward of Cape Egmont.

EAST COAST OF THE SOUTH (OR MIDDLE) ISLAND FROM CAPE CAMPBELL TO THE EASTERN ENTRANCE OF FOVEAUX STRAIT.

VARIATION IN 1875.

Cape Campbell - 15° 20' East	|	Banks Peninsula - 15° 55' East.
Otago - 16° 40' East.		

Cape Campbell, the north-east extreme of the South (Middle) Island, has been fully described at page 106. A low dangerous reef with a sunken rock off its extreme extends nearly one mile to the N.N.E. of the low extreme of the cape, and rocky patches extend off the shore almost the same distance for some miles to the southward.

CAUTION.—Vessels should not approach the land in this neighbourhood within two miles by day, unless coasters acquainted with the dangers; at night, and in thick weather, great caution must be observed when in its vicinity, although now well lighted.

LIGHT.—For description of light, see page 106.

The Coast from Cape Campbell to Kaikora Peninsula trends from Cape Campbell S.S.W., and is rocky for the first nine miles to the small river Waiharakaka, at the entrance of which is Flaxburn (see plan). ("There is temporary anchorage within a line of the reefs north and south of the river entrance, in five to six fathoms, in moderate weather and off-shore winds; and a snug little boat harbour at the mouth of the creek, very convenient for shipping cargo."—*Wellington Almanac*.) ("The beacons in line, W. by N. $\frac{1}{2}$ N., lead to Weld's Anchorage in 8 to 10 fathoms, four cables off

the reef at the entrance to river."—*Admiralty Chart*.) The coast southward of Waiharakaka is sand and shingle beaches, with rocky points, for 22 miles to Waipapa Point; the Benmore Mountain, 4,360 feet high, and the lofty Kaikora Mountains southward, give the neighbouring coast a bold and rugged appearance.

Immediately south of Waipapa Point, which is low and projecting, is Waiautoa or Big River. Nearly three miles south of Big River is a boat harbour; two white streaks in the wooded cliffs point out the landing place.

Kaikora Peninsula, a hummocky tongue of land 330 feet high, projecting two miles at right angles from the coast, is 20 miles southward of Waipapa Point. It forms Ingles Bay on the north, Gooch Bay on the south, and affords shelter to coasters from north-easterly and south-easterly gales.

Kaikora township is situated on the shores of Ingles Bay. Provisions of all kinds are easily procured, water is plentiful.

Ingles Bay (see plan) lies between Hapuku River on the north, and the northern point of Kaikora Peninsula on the south. The usual anchorages are well sheltered from the N.N.W. through W. to south-east with good holding ground, in depths varying from 7 to 10 fathoms, but open to north-east and easterly gales.

With north-easters the sea does not rise to any extent, but with easterly gales, though partly protected by the peninsula and Lynch Reef, a heavy sea runs into the bay. Small vessels seeking shelter from southerly and south-easterly gales should anchor well under Lynch Reef in seven to nine fathoms, sandy bottom, which enables them to make a good board to the N.N.W. should the wind shift into the north-east quarter.

BEACONS.—Four beacons on the cliffs near the sea, as leading marks, two for the outer and two for the inner anchorage, are as follows:—Upper outer anchorage beacon, *black* and white with white perch, 105 feet. Lower outer anchorage beacon, *red* and white with *red* perch, 95 feet. Upper inner anchorage beacon, *red*, 55 feet. Lower inner anchorage beacon, white, 40 feet, above high water.

DIRECTIONS.—Vessels from the northward may in ordinary weather steer direct for Mount Eyes, in the centre of the peninsula, until within about two miles of the shore, when a S.W. $\frac{1}{4}$ S. course for the outer anchorage beacons under Mount Eyes, will lead into a good outer anchorage in 10 and 11 fathoms, dark sand, within a few hundred yards of the St. Kilda Rocks, taking care to keep the Nine Pin Rock, which lies to the north-west, open northward of St. Kilda Rocks.

Vessels approaching Ingles Bay from the south in ordinary weather may steer moderately close (a cable's length) to Lynch Reef, which lies off Kean Point, the eastern extreme of the peninsula, and haul up to a course keeping the Nine Pin Rock open northward of the St. Kilda Rock, anchoring as above.

In bad weather give Lynch Reef a wider berth, as a rocky patch of five to six fathoms lies N.E. by E. $\frac{1}{4}$ E., $1\frac{1}{2}$ cables from the north-east point of the reef, over which there is a heavy break in bad weather from the south, and south-east.

Fyffe Cove, six cables westward of Lynch reef, is formed by Observation Point and the projecting reef to the eastward, and is capable of holding, properly moored, three or four coasters drawing not over six to eight feet.

DIRECTIONS for this inner anchorage: keep the outer anchorage beacons in line until the second set of beacons at the head of the cove are in one, when immediately haul up on this new line of bearing, which leads into the cove, clear of a rock awash lying on the eastern side of the entrance. Care must be taken not to go off the line of bearing for Fyffe Cove, as a dangerous rock with only six feet of water lies between the St. Kilda Rock and Observation Point.

Moorings on the rocks on both sides of the harbour enable vessels to lie with their heads seaward in comparative safety.

A jetty has been constructed to allow small craft hauling alongside to discharge cargo.

CAUTION.—Mariners are cautioned against bringing up amongst the kelp.

Davidson Rocks, N.W. by N., nearly $1\frac{1}{2}$ miles from Observation Point, and seven cables off the shore, is a dangerous shoal patch, awash at low water springs. Between them and the shore, and N.W. $\frac{1}{2}$ W. from Observation Point, is another dangerous patch, the Ruby Shoal, with three feet on it at low water springs.

To avoid these rocks, working in or out, do not open the Nine Pin Rock seaward of Kean Point, as that line of bearing leads on to the eastern portion of Davidson Rocks; and the current almost invariably sets northward, generally running stronger on approaching the shore.

Bullen Cove between Haul-round Point—the south extreme of the peninsula—and Baxter Reef to the westward, cannot be recommended on account of the bad holding ground and the detached sunken rocks on its south-east side.

Gooch Bay, on the south side of the peninsula, lies between Haul-round Point and the Kohai or Waite River. The anchorage is well sheltered from all winds but those between the south and east, with good holding ground at a depth of eight to nine fathoms, the south extreme of Baxter Reef on with Haul-round Point bearing E.S.E. In making for this anchorage from the northward vessels can haul close round the reef of Haul-round Point, and steer towards Bullen's Wool-shed, a conspicuous mark between the Kohai and Kahutara Rivers, until Mount Wharton is on with the northern peak of the Looker-on Ranges, when they may haul up for the anchorage clear of the Cone Rock, which lies $\frac{1}{4}$ of a mile S.W. of the end of Baxter Reef, and is nearly awash at low water.

Midway between Cape Campbell and Kaikora Peninsula rise the lofty snow-clad Kaikora Mountains, 14 miles from the coast, and 9,700 feet high, rising in sharp and rugged peaks; the Looker-on ranges, 13 miles north of the peninsula, are seven miles inland, of the same character, and 8,700 feet high.

CURRENTS.—The usual set of the stream at Kaikora Peninsula is northward along the land from three-quarters to one and a half knots per hour. A southerly current of a knot an hour is occasionally found after southerly winds. The velocity of the current and height of the tides are generally influenced by the prevailing winds.

WINDS.—The barometer falling, distant objects distinct, and a transparent atmosphere, gives warning of a north-wester. A slight fall in the barometer, with a thick bank rising to the south-east, rainy weather, and the hill-tops clothed with white mist, are certain indications of a south-easter, the barometer rising almost immediately after the wind sets in, which continues to blow violently, with a rising glass. In winter the prevailing winds are the north-east. In autumn and spring they are variable between north and east, but frequently a north-east swell sets in to Ingles Bay without the wind blowing home; this is considered a sure indication of north-west weather in Cook Strait. The finest months are from December to March.

Amuri Bluff is 11 miles southward of Kaikora Peninsula, with a bight two miles deep between, in which are several outlying rocks nearly one mile off shore; a reef six feet above water lies two miles northward of the bluff. Small coasters can moor in safety within these reefs. There is very deep water off Amuri Bluff, 184 fathoms having been obtained only two miles from the shore.*

The **Waiiau-ua River** is about 26 miles south of the Kaikora Peninsula. Its entrance may be known by Mount Caverhill, 2,000 feet high, which rises seven miles northward; its ranges, stony and rugged, terminate abruptly on the northern banks of the river. The Cheviot Hills, forming its southern boundary, are of a hummocky formation.

The narrow entrances of this river—through which a constant fresh runs out—are continually shifting, making it impossible to give any specific directions, and rendering it absolutely necessary for a pilot to be stationed here, should it be determined to open the navigation of this river.

No outlying dangers exist off the mouth of the river, which can be

* A shoal bank of four fathoms is reported to exist 12 or 15 miles south of Amuri Bluff, and six or seven miles of the shore.—Wellington and Canterbury Almanac, 1855.

approached boldly within half a mile in $4\frac{1}{2}$ to 5 fathoms, but vessels should not anchor in less than six fathoms, as the sea breaks some distance from the land in southerly and south-easterly breezes.*

Gore Bay (see Plan).—Six miles southward of Waiau-ua River is Gore Bay, a slight indentation in the coast. "A single anchor mooring for vessels up to 200 tons is laid in the bay, about 400 yards from the shore, opposite the new landing slip, in $3\frac{1}{2}$ fathoms, sheltered from all winds except from North to East, which seldom blow right in. Sailing vessels, if caught in such weather, would not be able to beat out from the moorings, and are advised to use their anchors in addition to the moorings. The boating establishment when completed will be very efficient, and with a vessel at the moorings great despatch in loading and unloading will be ensured. Vessels bound to Gore Bay will find no difficulty in making out the landing-place, which is immediately within the south side of the entrance, which when two miles from the shore should be brought to bear S.W. by W., then steer straight in. Large vessels should anchor in a convenient depth till a boat comes off. Seaward of the moorings the anchorage is open to the S.E., but from here a vessel can get under weigh with the wind in."—Marine Department, N.Z., 1878.

Considerable quantities of wool are annually shipped from this station.

The beach is very flat. For one-eighth of a mile seaward there is only a quarter to half a fathom water, when it suddenly dips to $1\frac{1}{2}$ and 2 fathoms. With any swell from seaward the sea breaks over this shoal ground with great violence, and in gales from the south-east it breaks nearly as far seaward as the general trend of the coast-line in five fathoms water.

There is every convenience for landing. A warping-buoy is laid down for hauling the boats in and out through the surf. Landing, however, should never be attempted excepting in a whaleboat. Mariners are recommended not to venture in their own boats, but to await the arrival of one of the fine surf-boats, when they can land with safety under the guidance of an experienced resident boatman.

ANCHORAGE.—The roadstead is open to all winds between the south-east and north. The holding ground is good, sand and clay; but in some places there is foul ground below the sand, necessitating a stout crown rope to ensure canting the anchor.

Vessels from the southward for Gore Bay must not approach too near Gibson Point on account of the Chapman and Mid-bay rocks, two dangerous sunken rocks to the northward and north-east of that point, the latter half a mile off shore, but must stand on a northerly course until the outer White Rock off McClellan Point is well open of the woolshed on the beach northward of it. They may then haul up for a beacon on the cliffs under Cavern Hill, which in one with the northern gable of a summer-house W. $\frac{1}{2}$ N., will lead clear of Mid-bay Rocks into an anchorage in four fathoms within two hundred yards of a warping buoy. There is always a swell in the roadstead, and a vessel must be prepared to leave with the first symptoms of a south-easter. H.W. F. & C. 4h. 10m.; spring rise, 5 feet.

CURRENTS.—In the offing strong currents setting northward often run one and a half knots per hour after south-east gales.

Rocks extend off the coast between the Waiau-ua and Hurunui River, which is nine miles south of the former nearly $\frac{1}{2}$ a mile. The Hurunui is only fit for boats.

Sail Rock lies close off a projecting cliffy coast four miles southward of Hurunui river. Eight miles further to the south-west is the Motunau or Table Island, which, like Sail Rock, has a white appearance in bright weather.

Table Island (Motunau) is small, three-quarters of a mile from the shore, and almost connected with it by reefs. Reefs extend nearly one mile eastward and southward, and a rocky patch, with four fathoms, two miles S.W. by S. of it.

From Table Island the coast recedes westward, becomes low and sandy,

* A shoal with four fathoms on it has been reported, lying N.E. by E., five miles from the mouth of Waiau-ua River.

and forms Pegasus Bay, the sea face of the northern portion of the Canterbury Plains. At the south side of the bay is Banks Peninsula.

Pegasus Bay is nearly 40 miles in extent, north to south, and 15 in depth; its northern shore, from Table Island to Double Corner, a distance of 12 miles, is cliffy, with a sand and stony beach at low water; four miles westward of the island two shallow patches—the only dangers in the bay—extend one mile from the shore.

From Double Corner—where there is good boat landing in fine weather—a sandy beach extends 27 miles nearly to the entrance of Port Lyttelton; five rivers run into the sea along this beach; the three northernmost are dry at their entrances at low water, the next is Courtenay River (*Waimakariri*).

SOUNDINGS.—The depth of water across the entrance to Pegasus Bay is 20 fathoms, shoaling gradually to six and seven fathoms one mile from the beach; this regular change in the soundings, and the distance they extend off this part of the coast in particular, renders the approach to Port Lyttelton easy at night or in thick weather.

Waimakariri River.—The entrance bears from Godley Head N.W. by N. 12 miles. There is a bar which is constantly shifting and varying in depth. A signal-staff with semaphore arms stands on the highest sand-hill immediately southward of the entrance; two moveable beacons are placed on the south spit and kept in one as nearly as possible with the deepest water over the bar, generally about three feet at low water spring tides. Vessels of 40 tons can ascend to Kaiapoi; the navigation of the river inside is easy, the channel well staked.

Avon River (*Opawaha*).—The entrance lies at the south extreme of the sandy beach of Pegasus Bay, 2½ miles N.W. of Godley Head, the north entrance point of Port Lyttelton. In moderate weather it is accessible to vessels drawing from 8 to 10 feet water. The bar two cables outside Cave Rock is 400 feet in width of fine sand, with a depth in the channel of not less than five feet at low water springs, shoaling gradually on either side.

The greatest strength of current does not exceed from five to six knots. The highest water on the bar would be 12 feet at springs and 9 to 10 at neaps, the range seven to five feet.

SIGNALS.—On Cave Rock at the entrance is a signal staff, vessels are piloted in by means of semaphore arms. Vessels of 40 tons can enter safely at the proper time of tide, and ascend the river to the ferry, smaller craft to the quay within two miles of Christchurch. Small steamers now run between Lyttelton and Christchurch.

SOUNDINGS BETWEEN CAPE CAMPBELL AND BANK'S PENINSULA.—From Cape Campbell to Banks Peninsula, a distance of 130 miles, there is no place of shelter, with the exception of temporary anchorages in fine weather under Kaikora Peninsula, and no dangers extending more than one mile from the shore, except 12 or 15 miles south of Amuri Bluff, where a bank with four fathoms on it has been reported six or seven miles from the land. Large vessels are not recommended to approach within three miles, at which distance, between Cape Campbell and Kaikora Peninsula, the depth is 30 fathoms, and 10 miles off shore 80 fathoms. Southward of Kaikora Peninsula, the water deepens suddenly; five miles from the land there is nearly 200 fathoms; while 22 miles farther south abreast of Waiau-ua River, there is only 30 fathoms at the same distance. In the parallel of Hurunui River, when approaching the north end of Pegasus Bay, at 23 miles off the coast: 60 to 65 fathoms, fine grey sand, will be found.

TIDES AND CURRENTS.—The flood tide sets northward, the ebb southward, nearly one knot an hour on this part of the coast; occasionally after southerly winds the usual northerly set has been found to run in the opposite direction.

Banks Peninsula extends 20 miles in an easterly direction from the plains on the mainland, with a width of 17 miles. It contains—with the exception of Otago—the only harbours on the eastern side of the South Island. A mass of rugged, and—in parts—densely wooded mountains, about 3,000 feet high, bounded by an exceedingly broken coast line, indented with numerous bays and coves. On its southern side is the Waihora Lake, an

extensive but shallow sheet of water, only separated from the sea by a strip of low shingle, scarcely half a mile wide.

From the remarkable appearance of this apparently isolated land, there is no possibility of a vessel mistaking her position (at night Akaroa light is visible 22 miles); and the bank of soundings extends 25 miles off, a feature almost peculiar to this part of New Zealand.

The principal harbours are Port Lyttelton and Akaroa Harbour; also Levy and Pigeon Bays, snug anchorages; besides several smaller ones, which offer shelter for boats passing from one harbour to another.

Port Lyttelton (*Tewhaka*) lies on the N.W. side of Banks Peninsula, the entrance also common to Fort Levy, $2\frac{1}{2}$ miles from the south end of the sandy beach of Pegasus Bay, is two miles wide between Godley Head on the north-west and Baleine Point on the south-east; and runs in a S.W. by W. direction, seven miles. Toloa or Adderly Head, between the harbours, lies back from the other two. The entrance between it and Godley Head is one mile wide. Lyttelton is on the north shore in a bay four miles from the entrance; above it there is only water for small coasters.

A description of the harbour improvements, breakwaters, jetties, etc., will be found in the Introduction, page 36.

Godley Head and Light.—Godley Head is a perpendicular volcanic cliff of a dark red colour. On it is a *fixed* white light, 440 feet above the sea, seen between the bearings of W. $\frac{1}{4}$ N., round by west and south to S.S.E. $\frac{1}{4}$ E., visible in clear weather 30 miles. The tower (white) is 30 feet high. From its great altitude, may be expected to be often obscured by fog.

PILOT.—The pilot station is in Little Port Cooper just within Adderly Head. A look-out is kept day and night; vessels requiring a pilot after dark should, when nearing the heads, burn a blue light or show a flare up, and the signal will be promptly answered by the look-out on Adderly Head.

In approaching the harbour from the northward, Mount Herbert, the highest peak of the peninsula, is a prominent mark, Port Lyttelton lying westward of it.

On a nearer approach, Mount Pleasant, the highest peak on the north side of the harbour, is easily distinguished, being bluff towards the port and sloping off gradually to the lowland.

Cooper's Knobs, at the head of the harbour, are two or three remarkably round, wooded, overhanging peaks, and form a leading mark for steering up the harbour, with the house on Quail Island under them S.W. by W.

Vessels from the southward after rounding the peninsula should keep along the land, about one mile and a half off, until they open out ports Lyttelton to the West and Levy to the South.

There is good anchorage outside in calm or southerly weather, soundings from 7 to 10 fathoms four or five miles from the shore.

The entrance to the port is one mile wide, and the same width as far as the anchorage off Lyttelton. The course up Port Lyttelton is S.W. by W. $\frac{1}{2}$ W.; the entrance heads are bold and steep-to with eight fathoms between, decreasing gradually to $3\frac{1}{2}$ fathoms at the anchorage; there are no dangers on either side in working up, with the exception of the Parson—a small detached pinnacle—with eight feet on it at low water; it lies N.N.W. from Ripa Islet (near the south shore, $2\frac{3}{4}$ miles within the heads), $1\frac{1}{3}$ cables from the shore. A small *red* buoy has been placed on an outlying detached rock of 14 feet, about 30 yards outside the eight-foot rock.

The bottom for the greater part is composed of soft mud; it is safer for vessels to lie at single anchor with a long scope (60 or 70 fathoms), with the second anchor ready, than moored.

Port Lyttelton is easy of access in most weathers, except in south-west gales, which draw out with great violence. It is somewhat open to easterly winds, but gales from that quarter are not of frequent occurrence, north-east and south-west being the prevailing winds. With strong Northerly, E.N.E. and S.E. winds, a considerable swell rolls into the harbour.

The tides are irregular during both springs and neaps and cannot be depended on, being greatly affected by the wind.

Little Port Cooper immediately within Toloa Head is a small bay

open to northerly winds. Three miles further up, on the same side, is a deep cove, too shallow for anything but boats.

Quail Island, connected at low water with the mainland, also lies on the southern side of the port, opposite Lyttelton, and $1\frac{1}{2}$ miles distant from it.

OUTER ANCHORAGE.*—Midway between Quail Island and the town is Shag Reef; vessels of large tonnage using this anchorage should anchor three-quarters of a mile outside this reef, with the eastern point of Erskine Bay—in which the town stands—in a line with the Custom-house, bearing N.N.W. $\frac{3}{4}$ W.; in $3\frac{1}{2}$ fathoms at low water, muddy sand, at a distance of three to four cables off the eastern breakwater. The eastern or outer end of the town should not be opened out. Strangers are recommended to bring up well south of the breakwater.

INNER HARBOUR.—Breakwaters have been thrown out from Officer's and Naval Points, forming a secure inner harbour (see page 36) in which eight sets of screw moorings have been laid down capable of holding vessels up to 2,000 tons. Vessels anchoring under western breakwater must leave the approach to Peacock's wharf quite clear.

WATER.—Fresh water is brought from Christchurch by rail.

"CABLE.—The telegraph cable is laid across the harbour a quarter of a mile within the heads from a small white house in Whaler's Retreat, a small sandy bay in the N.E. corner of Little Port Cooper, to a small bay on the north side of the harbour, also with a small white house, and a zig-zag road leading to the light-house westward of the following bearings, viz. :—The Light-house on the north head, and the Look-out house, painted white, on Adderly Head on the south. All vessels should anchor seaward of the above line of bearings, or not until westward of the white painted patches 20 feet x 8 feet, and bearing from each other N.N.W. and S.S.E. The latter white marks are one half mile inside the heads. Vessels anchoring at the heads according to the above instructions, will run no risk of fouling the cable, as sufficient scope is allowed for getting under weigh.

"CAUTION.—During the dredging operations now in hand (and to be carried on for eighteen months or two years from July, 1880) in the fairway at the entrance of the inner harbour, between the two moles, masters of vessels are *cautioned* to take the entrance eastward of the Dredge and her buoys. The Dredge's S.W. bower anchor will be laid about 600 feet outside the moles, and be buoyed with a large *red* buoy. The side moorings will be similarly buoyed. Masters of vessels are hereby cautioned against going near or over the Dredge's moorings, and all steamers are required to slow their engines to *less than half speed* for at least 100 yards before arriving abreast of the Dredge. This notification to take effect from and after 30th May, 1880, and to remain in force until revised or altered. Masters of all vessels are cautioned *against* entering between the moles *at night*. Vessels must *not* anchor within the inner harbour light-house on the eastern breakwater anything northward of N.W."

The above information, the description of breakwater, &c., is furnished by Captain McLellan, Harbour Master.

"A fixed red light is shown at the extreme of the eastern breakwater, 15 feet high. The entrance between the breakwaters is 550 feet navigable, with a depth of 17 feet 4 in. for 230 feet in the centre."—*Nelson Almanac*.

Port Levy—see Plan—(*Kokorarata*) is close eastward of port Lyttelton; it runs due south for about three miles, and is three-quarters of a mile wide at the entrance, narrowing gradually within; the only dangers are some straggling rocks which extend half a cable off its western shores. The soundings decrease from eight fathoms at the entrance to $3\frac{1}{2}$ fathoms $1\frac{1}{2}$ miles within, where a vessel should anchor; the holding ground is good, but the port is open to northerly winds. The upper part is shallow, and only fit for small coasters.

* During the stay of H.M.S. *Challenger* at this port in 1869, strong sea-breezes were experienced, which sent in a heavy uncomfortable swell. The holding ground, although mud, is of such a treacherous consistency, that during strong breezes ships nearly always drag their anchors, slowly but surely, through it. The *Challenger* dragged nearly a cable in 36 hours, with 50 fathoms of chain out and a clear anchor; while merchant ships dragged much further. I feel convinced that no vessel would hold in this port during a strong north-east gale; the sea would then break in five fathoms.—From Remarks Nav. Lieut. H. Y. Slader, H.M.S. *Challenger*, 1869.

TOLOA HEAD, the western entrance point, is bold and perpendicular. Balaine, the eastern point, is rocky, but not high, with a rock above water about half a cable off it; there is also a rock off the point, with a boat passage between, a quarter of a mile further eastward. A detached conical rock, with a sunken rock a short distance outside it, lies $1\frac{1}{2}$ cables off shore one mile south-eastward of Balaine Point.*

Pigeon Bay (*Wakaroa*), similar in feature to port Levy, is $2\frac{3}{4}$ miles south-east of it, runs in a parallel direction nearly four miles, and is separated from it by a ridge of hills from 1,500 to 2,000 feet high. It is easy of access; vessels may anchor in $3\frac{1}{2}$ fathoms, $2\frac{1}{2}$ miles within the entrance.

$1\frac{1}{2}$ miles from the entrance on the western side is a deep ravine, with a good stream of water, and anchorage off it in $5\frac{1}{2}$ fathoms, good holding ground. The eastern entrance point, *Wakaroa*, has some rocks lying nearly a cable off it, and a sunken rock is reported from $1\frac{1}{2}$ to 2 cables due north of Pigeon Point, the western entrance head; otherwise it is free from dangers.

Between Pigeon Bay and the eastern extreme of Banks Peninsula, a distance of 15 miles, are several small bays, the principal of which are Akaloa, Oken, and Bone Bays, each little over one mile deep, and about half a mile wide; the coast between is steep and iron-bound.

AKALOA is a double bay, rocks extending from the middle head to the north-west, almost close the western portion. The eastern bay runs in a southerly direction nearly two miles, and is narrow, but has four fathoms one mile within. The eastern head is a remarkable steep and projecting point.

LONGLOOKOUT POINT is the western point of Akaloa Bay. In September, 1863, the ship 'Catherine' is said to have struck on what was supposed to be a pinnacle rock lying three-quarters of a mile off the north-east extreme of Longlookout Point, or half a mile outside the rocky patches marked on the Admiralty chart.

CAUTION.—Vessels are cautioned, until the dangers off this salient point of the coast are farther examined, to give it a berth of at least one mile in passing.

CURRENT.—There is a constant current setting northward off the peninsula, varying in strength from one to two knots per hour according to the wind.

THE SAIL ROCKS, a detached cluster a third of a mile off the coast near the east point of Oken Bay; in their immediate vicinity the coast line becomes low, which adds to their sail-like appearance when seen as an extreme of the land.

BONE BAY is two miles north of East Head. It runs in a West direction, with anchorage nearly one mile within in four fathoms; the south entrance point, a perpendicular cliff from 300 to 400 feet high, is Steep Head. Neither of these bays are eligible for any but small vessels; they are exposed to easterly and north-east winds.

From Putakolo Head, high and clifty, one mile south of East Head, the coast rounds away southward and westward.

SOUNDINGS.—The depth of water one mile off shore, from Port Lyttelton to Bone Bay, is from 9 to 10 fathoms, sand; southward the soundings increase to 12 and 20 fathoms at the same distance.

On the southern side of the peninsula, 11 miles from East Head, is the entrance to Akaroa Harbour; the intermediate coast is rocky and indented, with numerous narrow but deep bays; the projecting points are clifty with straggling rocks near; among the latter, five miles E.N.E. from Akaroa, is a remarkable columnar rock, Pompey's Pillar.

Akaroa Harbour (see plan) extends in a northerly direction more than eight miles, affords secure and land-locked anchorage to any number of vessels, and is easy of access in moderate weather.

CAUTION.—During strong south-west winds there is a heavy cross sea at the entrance, with violent baffling squalls caused by the high precipitous

* On port Levy rocks, which are an outlying danger, and in a fog very difficult to distinguish from some outlying rocks about a mile to the eastward, a basket beacon of iron painted white is erected.

nature of the shores ; at such times entering with a sailing vessel is attended with some degree of danger.

LIGHT.—“ A white flashing light, at an elevation of 270 feet above the sea, shewing a flash every ten seconds, is exhibited on Akaroa Head” from a tower 28 feet high ; visible in clear weather 22 miles all round as far as the land permits.

The heads are bold and steep ; off Trueni Point (the eastern), two cables from the shore, lies Boat Rock, a black rock 20 feet high.

IRON HEAD (*Timatim*), the western entrance point, is a dark grey high perpendicular cliff ; detached rocks 15 feet high extend southward of it ; others outside, on which the sea breaks, extend nearly three cables from the shore.

WRIGHT ROCK lies S. by W. about half a mile from the south head of Akaroa Harbour : pinnacle-shaped, with about 11 feet over it at low water ; it only breaks in a heavy sea.*

The entrance, nearly one mile wide, continues so to Cavern Head, a steep cliff on the eastern shore, $1\frac{1}{2}$ miles within ; here it is somewhat less, but immediately afterwards increases to $1\frac{1}{4}$ miles, to the anchorage in Pakaeriki Bay, on the eastern shore nearly six miles from the heads. The harbour trends N.W. by N. at first, then nearly N. by W.

Vessels should not anchor until above Nine-fathom Point, $2\frac{1}{2}$ miles inside the head ; outside this there is generally a swell, and bad holding ground ; above this point the depth decreases gradually from nine to six fathoms ; in Pakaeriki Bay there is excellent anchorage, in four fathoms at low water, little more than half a mile off the settlement. A reef, awash at high water, extends over a cable off Observation Head, the south or outer point of this bay, off its extremity, a *white buoy* has been placed ; otherwise there are no dangers.

Above Pakaeriki Bay there is good anchorage in not less than three fathoms at low water. A remarkable peninsula projects from the head of the harbour three-quarters of a mile in a southerly direction, connected by a long narrow neck.

Onoui Bay, westward of the peninsula, is shallow, but the three bays to the eastward are available for vessels of 12 or 14 feet at low water. There is a road from this head of Akaroa Harbour to Port Lyttelton.

Wood and water are to be obtained in abundance at Akaroa.

The influence of the tide is very little felt in the harbour.

The winds generally draw either up or down. Vessels should not attempt to leave with a strong southerly wind. Southerly winter gales blow with great violence.

SOUNDINGS.—A bank of soundings, with 10 fathoms, is reported two to three leagues off Akaroa Heads.

From **Akaroa** to the **Westward** the coast takes a westerly direction for seven miles to Peraki Cove, a snug anchorage with off-shore winds.

Three miles westward of Peraki the rugged and imposing coast line of the peninsula is succeeded by a low cliffy and shingle shore, 70 miles in extent.

The **Ninety-mile Beach** commences at the south-west extreme of Banks Peninsula. The first five miles is a narrow strip of shingle beach scarcely half a mile wide, forming the sea boundary of Wahiora Lake. It communicates with the sea through a narrow opening in the shingle at its southern end, but is closed for a great part of the year ; hence the coast trends S.W. 55 miles, composed of low cliffs from 20 to 40 feet high, fronted with a shingle beach, through which several rivers find their way to the sea. These are only available for boats ; their depth and velocity vary according to the seasons.

Timaru and Roadstead (corrected from information received from Harbourmaster).—At the extreme of the Ninety-mile Beach a rocky projection from the coast occurs named Timaru, now a port of considerable importance, $1\frac{1}{2}$ miles north-west of Patiti Point (see page 36 for account of

* The position assigned to it on the chart is S.W. $\frac{1}{2}$ S. 6 cables, from Timatim Head.

town, harbour works, etc.). The mountain ranges approach here near the coast, and instead of the low level country farther north there are grassy slopes ascending gradually to the ranges. Seven miles northward of Timaru two isolated clumps of trees will be seen about three miles inland. The Wanganui River runs between them. They are remarkable as being the first wood seen on the coast south of Banks Peninsula.

The coast line from Banks Peninsula to Timaru is low, and cannot be seen in thick weather or by night until close in with the breakers, while southward of the town of Timaru the cliffs are from 30 to 50 feet high. This is a sure guide to Timaru, viz., low shingle beach northward, moderately high cliff southward.

A vessel can safely stand off and on this part of the coast by keeping outside a depth of seven fathoms.

If the weather is clear the high mountain range will be seen behind Timaru long before the coast line has risen. Burke's Pass, a remarkable gorge almost directly behind Timaru, is a good landmark, showing a distinct gap: there is a village a short distance north of and in sight of Timaru, but the cliffs above mentioned will prevent any mistake.

DIRECTIONS.—Vessels bound for Timaru, after rounding Banks Peninsula, should steer S.W. by W. southerly, unless the wind be strong from E.S.E., which causes an inset, when it is necessary to keep three-quarters of a point more southerly.

The shore from the end of the beach to Patiti Point, a long mile S.S.E. is fronted by sands and shoal patches, with outlying reefs of rock and kelp always breaking, the reefs extending nearly two-thirds of a mile direct to seaward from Patiti Point, and one and a half miles to the south-east from the storehouse at Timaru. "The reef off Patiti Point runs out a quarter of a mile further than is marked on the charts, and should have a wide berth."—Harbour Master.

LIGHT.—A *fixed white* light is shown from a tower 30 feet high, painted stone colour, in the town, elevated 85 feet above the sea, visible from N. 20 W., round by the West to S. 20 E., 14 miles in clear weather. It bears from Patiti Point N.W. $\frac{1}{2}$ N., $1\frac{1}{4}$ miles. If made by night bring it to bear W.S.W., and run in on that bearing, anchoring in $5\frac{1}{2}$ and not less than $4\frac{1}{2}$ fathoms.

ANCHORAGE.—The breakwater now in course of erection alters the conditions of anchoring, etc. On the completion of the work revised directions will be necessary. At present there is 18 feet alongside the part already completed, with a wharf where vessels can lie and discharge in moderate weather—see page 36. The following is given in the 'N.Z. Pilot,' viz.:—"For a ship of 1,000 tons the storehouse at Timaru, bearing W. by N., about one mile distant, and the extreme of Patiti Point, S. by W. in $6\frac{1}{2}$ fathoms, fine sand; and for small vessels the storehouse bearing S.W. $\frac{3}{4}$ S., about half a mile distant, and Patiti Point S. by E. $\frac{1}{4}$ E., in $4\frac{1}{2}$ fathoms, fine gray sand; both these berths (recommended for moorings) are within half a mile of the outlying reefs."

SIGNALS.—The following local signals are used as required:—

Vessel may stand in safety.—Four balls horizontal on yard, two on each side of mast.

Anchorage unsafe, keep to sea.—Three balls horizontal on yard, two on one side of mast, and one on the other.

Put to sea.—Two balls horizontal on yard, on either side of mast.

You are running into danger.—J.D. commercial code.

NIGHT SIGNALS.—The night signals are as published in the New Zealand Harbour Regulations; but when it is intended that vessels at anchor should put to sea, two guns will be fired in addition to showing the proper lights. "Vessels frequenting this port should be provided with at least one extra heavy anchor and strong cable. There is a good boat establishment."—Marine Department.

In bad weather a look-out is kept on shore, and every assistance is rendered when required. An efficient Rocket Brigade, with all necessary appliances, under the control of the Harbour Master, is always in attendance near the lighthouse, on the approach of and during bad weather. Boats can

now always be launched under the breakwater. Vessels requiring a pilot may always in daylight rely upon being boarded.

From Patiti Point southward the coast line is again formed of low cliffs fronted by a shingle beach, and extends 30 miles in a south direction to Waitangi (chart, Waitaki) River, with several small streams intervening. A high mountain range, 3,500 feet (the Hunter's Hills) approaches within a few miles of the coast between Timaru and Waitaki River.

Waitaki River is a considerable stream; its entrance may be known by the low tongue of land it appears to have thrown out from the hills near. Its velocity in summer, during the melting of the snows, is so rapid as to render it unfit even for boats to enter. This river may be said to form a natural boundary between the Canterbury and Otago settlements.

The Coast from Waitaki River trends S.S.W. 25 miles, to Look-out Bluff. The low cliffy coast with shingle beach continues for 15 miles, as far as Cape Wanbrow, a protecting bluff of moderate height, thence it assumes a different aspect, being broken into sandy or shingle bays, with cliffy points between.

Oamaru.—(For description of breakwater, etc., at this important place see page 37). Close northward of Cape Wanbrow is Oamaru, a safe anchorage with all winds excepting those between N.N.E. to S.S.E.

OUTER ANCHORAGE.—There are no leading marks for this; vessels can stand in till within a mile of the breakwater and anchor in 5 and 5½ fathoms. The same remarks as for ships anchoring off Timaru apply here; there is a good boat establishment.

LIGHT.—A *red* light is shewn at the bluff, visible from seaward five to seven miles, on all points from N.N.W. to S. by W. A *green* light is shewn on the end of the breakwater in fine weather, and when that cannot be done the danger lights are hoisted on a flagstaff immediately south of the breakwater, viz., "Put to sea" or "Keep to sea"—by day, two balls horizontal on yard on either side of mast; by night, two *white* lights horizontal, with *red* light between.

CAUTION.—Masters of vessels in the roadstead will have to exercise judgment as to the practicability of getting their vessels to sea, as these signals have at times to be exhibited during calm weather.

It is H. W. F. & C. 2h. 50m., range 5 to 7 feet.

Note.—The above is corrected from information received from local sources. When the works are completed revised directions will be necessary.

Moeraki Bay.—Look-out Bluff (*Awa-Mokihiki*) is the north point of this bay, Whalers Home Point being its southern extreme. The bay is five miles long north and south, and two in depth; the coast line is fronted with a sandy beach; a reef nearly three miles long, covered with kelp, extends nearly across its entrance from north to south, 1½ miles distant from the beach, and is a great protection to the bay; there is anchorage for coasters, though not prudent to remain with any symptoms of bad weather from the eastward.

LIGHT.—A *fixed white* light is shewn from the southern point of Moeraki Peninsula, on a white tower 28 feet high. The light is 170 feet above the level of the sea, and is visible as far round as the land allows for 19 miles.

WHALERS HOME POINT, the eastern extreme of a cliffy projection, is nearly three miles in length, with sandy coves on its north and south sides, forming good boat harbours. A small islet (White Islet) and some scattered rocks, under water, covered with kelp, lie half a mile off its northern part; 1¾ miles eastward of its southern extreme is Fish Reef, extending in a north-west and south-east direction one mile, uncovers at low water, and has deep water close outside.

From Moeraki Bay a sandy bay extends five miles, the south extreme of which is Vulcan Point. Shoal water extends two miles southward of this point, at the extreme of which is Danger Reef, a sunken rock, marked by kelp. Three remarkable mountain cones rise just southward of Vulcan Point, two or three miles from the coast.

Waikouaiti Bay, 17 miles southward of Whalers Home Point, and 10 miles north of Otago Harbour, has a clean sandy beach two miles in extent; its southern point is Mistaken Islet, close northward of which is the

entrance of a small river. There is anchorage in the bay with off-shore winds in five fathoms half a mile off shore. This bay is frequented by small coasters. "On the south head a bright fixed light is exhibited, visible about seven miles in clear weather between the bearings of S.E. $\frac{1}{2}$ E. and W. by S. $\frac{3}{4}$ S."—Wellington Almanac.

AHURIRI ROCKS lie three-quarters of a mile from the shore, and two miles northward of Jones Head, the north point of Waikouaiti Bay; it has five feet water on it at low water, with two to four fathoms close to. From it Remarkable Cliff, near Tairoa Head, bears S. by E. $\frac{3}{4}$ E., Vulcan Point N. by E. and Harris Bluff S.S.W. $\frac{1}{4}$ W.

CAUTION.—Vessels should not approach the coast between Oamaru and Otago Heads (unless bound to Moeraki) within $2\frac{1}{2}$ miles, as sunken rocks extend for a considerable distance out.

Blue Skin Bay, between Waikouaiti and Port Chalmers, is nearly five miles in depth; some rocks, which show, extend off its northern shores for about half a mile; otherwise it is clear of dangers, with a depth of 7 to 10 fathoms. Several sandy bights on its southern sides afford anchorage with off-shore winds.

SOUNDINGS OFF THE COAST.—The bank of soundings is well defined; knowing the latitude, a ship's position may be determined with tolerable accuracy. Northward of Moeraki Bay there is 50 to 60 fathoms sand 30 miles off, and about 30 fathoms at half that distance, decreasing gradually to 10 fathoms three miles from the shore, where the bottom is chiefly gravel and stones. Between Look-out Bluff and Otago Harbour are the Kelp Reef, Fish and Danger Reefs, and Ahuriri Rock; all excepting the latter either visible or marked by kelp, and not extending over two miles from the coast.

Southward of Moeraki Bay the deep water approaches nearer the coast; 20 miles off there is 60 fathoms, sand and coral, and at 30 miles no bottom was found with 400 fathoms line; at two miles from the coast there is 15 to 18 fathoms, while immediately eastward of Otago Harbour the 100 fathom line of sounding only extends 12 miles from the land, inside that distance it shoals rather rapidly to 30 fathoms; and 14 fathoms within two miles of the entrance.

Otago Harbour (see plan).—The following is almost entirely from the amendment of the "New Zealand Pilot," compiled by the Secretary of the Otago Harbour Board, from data furnished by the Chief Harbourmaster of Otago (Captain William Thomson), 22nd June, 1877:—

"OTAGO HARBOUR.—The approach from the southward is well denoted by Cape Saunders, and its remarkable isolated mountain, 1,410 feet high; from the northward and eastward by the gap its entrance makes in the land, as also, in hazy weather, by a remarkable bank of dazzling white sand, at the base of the steep cliffs forming its western entrance head. This bank of sand, from a distant offing, is frequently mistaken for breakers on the bar.

"LIGHTS.—A light is exhibited from a lighthouse on Tairoa Head, at the east side of entrance to Otago Harbour. The light is fixed red, visible from seaward when bearing W. $\frac{3}{4}$ S., round by south to S.E. It is 196 feet above the sea level, and in clear weather should be seen at a distance of 20 miles. The tower is 39 feet high, white, the lantern dome being dark green, and forms an excellent beacon by day as well as by night. In foggy weather a gong is sounded every fifteen seconds. Two leading lights are exhibited from two white towers erected on the sandspit at the west side of entrance to Otago Harbour. They are 300 yards apart S.S.W. and N.N.E. From the upper or inner tower a fixed green light is exhibited 36 feet above sea level; from the lower or seaward one a fixed white light 26 feet above sea level. These lights may be seen from seaward from S. 41° E. to S. 34° W. at a distance of six to seven miles.

"SIGNALS.

"As Otago is a bar harbour, there are times when it would be unsafe for vessels drawing more than 16 feet to attempt to enter. To denote the state of the bar the New Zealand General Signals (page 39) are exhibited from Tairoa Head, under the care of an efficient signal master.

"The Commercial Code of Signal Flags is used as required.

"PILOTS.—An efficient staff of pilots is stationed at Tairoa Head,

They are at all times ready to push out when the bar is passable. They offer their services to the nearest inward-bound vessel having a pilot-signal flying, unless another vessel be observed running into danger, in which case every exertion will be made to board and assist the latter vessel; preference is always given to her Majesty's ships and mail packets. The pilots board vessels within a radius of three miles from Taiaroa Head, unless the sea on the bar renders it unsafe for the boat, which seldom occurs; if unsafe the pilot places his boat in mid-channel inside the bar, showing the pilot-flag, for which a vessel entering must be steered as soon as the red and white beacon at the pilot station opens out to view. If the wind is strong and northerly, the vessel should run in under easy canvas, to enable the pilot to board in safety, as there is not room to round a vessel to in the channel. On nearing the port, and the wind northerly, if necessary to wait for daylight or the tide, when it is not safe for a pilot to board, stand off and on, not bringing the lighthouse to bear eastward of south, and thereby benefit by the northerly current to keep to windward.

"ANCHORAGE.—The outer anchorage is safe when there is no easting in the wind. Small vessels anchoring in same should keep near the line of the leading lights, in nine fathoms, about half a mile from the shore; large vessels about $1\frac{1}{2}$ mile off, in 15 fathoms, Taiaroa Head Light-house bearing about south.

"ENTRANCE AND HARBOUR.—The entrance to the port lies north and south. Taiaroa, its eastern head, is a bold dome-shaped rocky headland, 244 feet high, with a flagstaff on its highest part; from this head the bar extends in a north-westerly direction towards Hayward Point, the northern extreme of a bluff precipitous headland, forming the north-west entrance head of the port. Within the entrance a spacious sheet of water extends south-westward a distance of 11 miles; at its head stands the town of Dunedin. Seven miles within the heads a prominent headland, with two adjacent and lofty islands extending across the harbour, form a natural division, above which the channels leading to Dunedin become either too shoal or too narrow for the larger class of vessels to proceed farther. Vessels drawing not more than 12 feet are, however, regularly berthed at the wharves at Dunedin; and in the course of a few months the dredging operations now being carried on by the Harbour Board will enable vessels not drawing more than 14 feet to be berthed there. A deep-water channel, having 18 feet at low water, has been determined and entered upon, and it is estimated that in three years from the commencement of active operations, the largest class of vessels will be able to reach Dunedin.* A mile eastward of the midway islands already referred to is the town of Port Chalmers at the head of Koputai Bay, where there is good anchorage for large vessels in five fathoms. Here the large class of vessels discharge cargo, which is conveyed to Dunedin either by the railway or by lighters.† A reference to the plan of this harbour shows that when within the bar the channel leading to Koputai Bay is deep but narrow, extensive sandbanks filling up the central space of both divisions of the harbour. This channel is well marked by a series of beacons and buoys, but a stranger should not proceed without a pilot beyond the first anchorage within the entrance.

"INNER ANCHORAGE.—The inner anchorage, between Howlett Point and the first buoy on the inner bar, is safe in any weather. Vessels anchoring below Harrington Point, the nearer they are the sandspit the better; above the point they should get into the bight a little abreast the old Native Village. Vessels of light draught only can work into the inner anchorage, and when working out on the ebb care must be taken not to stand too close over to Haywards Point, as it is very deceptive going with the tide and swell which set in that direction; the swell increases as you near the point, and tends to cause the vessel to miss stays, placing her in a critical position ere

* The new channel in the upper harbour has been cut through the sand-bank, and has been dredged to a depth of 14 feet at low water. Within six months the communication is to be completed for vessels drawing 18 feet water. The deep water basin now being dredged to the depth of 15 feet at low water will be completed in about eight months. Area of basin, 20 acres; extent of wharfage, 3,000 feet. A complete system of steam cranes for discharging is established. — Oct., 1880.

† See page 37 for Graving Dock at Port Chalmers.

she can be brought up, and by club-hauling be put on the opposite tack. The bight is dangerous to get into, and the holding ground bad.

“BARS.

“The outer bar extends one mile in a north-west direction from Taiaroa Head, composed of hard white sand, and is in parts an extremely narrow ridge, difficult to touch upon with the lead, with a fathom deeper water on either side; the depth on it varies, being a little deeper after the winter gales (July and August), which blow from south-west. About one mile inside the heads, above Harrington Point, there is an inner bar, but as there is always smooth water on it, it presents no obstacle to navigation. There is now more water on both bars than formerly; the deepest and best part for crossing is $2\frac{1}{2}$ cables' length from Taiaroa Heads. The depth of water at present (1880) in the channel across the outer bar is $16\frac{1}{2}$ feet at low-water spring tides, and across the inner bar, 27 feet.

“SAILING DIRECTIONS.

“The outer bar should not be attempted on the ebb tides, unless with a commanding breeze, as it sets strongly towards Hayward Point. Light south-easterly winds, which are generally accompanied by a light sea-fog, cause a troubled swell on the bar, which is not the case with those from N.E., to which quarter it is more exposed. A strong north-east wind with the ebb tide makes a broken bar, dangerous for boats, but the swell goes down at all times very quickly, particularly with westerly winds. Being off the bar two miles, in 16 fathoms of water, bring the leading lights in one, S.S.W.; steer on this course across the bar (the crossing of which will be immediately detected by the rapid deepening of the water and its smoothness), until the small fixed red light shown on the red and white beacon at the pilot station (not visible from seaward) opens out; then haul up for Harrington Point, the first rocky point half a mile within Taiaroa Head, passing it at half a cable's length, being quite steep-to; or midway between it and the low dry spit of sand on the opposite shore, continuing a mid-channel course between the buoys on the inner bar, keeping the red on the starboard side and black on the port, passing the lightship on the starboard hand, about 200 feet off. Having passed the lightship (which is moored in 16 feet at low water spring tides, and about $1\frac{1}{2}$ cable's length S.W. by S. from the first red beacon, steer right for the bright fixed light that is shown in Dowling Bay, but care must be taken to judge the distance in sailing up through the cross channel, in order that the vessel may not run into the bay. The channel upwards to the Dunedin wharves is well defined with buoys and beacons—the red beacons having bright fixed lights on them.

“BUOYS AND BEACONS.

“The arrangement of the buoys and beacons marking out the channel in both the lower and upper harbours is, that those painted black mark the port side, and those painted red the starboard.

“NORTH CHANNEL

“In smooth water, with a commanding breeze, there is an available channel within the bar, between it and Hayward Point, with from 22 to 25 feet at high water. Vessels intending to take it should bring the entrance of the harbour between Harrington Point and the low sandspit opposite it, open on, a S.E. $\frac{1}{2}$ S. bearing, and sail in on this course until abreast of the black buoy that is moored in 19 feet at low water on the western extremity of the bar, passing it about a ship's length off, then haul up for Taiaroa Head until abreast of the first red buoy that is moored in 17 feet at low water, passing it also about a ship's length off; on rounding this buoy a sharp curve must be made, passing the second red buoy a ship's length off, steering midway between Harrington Point and the Sand Spit, and then proceed as before directed.

“DRIVER ROCK is the only danger outside the line of the bar, with seven feet at low water. It lies N.E. $1\frac{1}{2}$ cables from the north-east extreme of Taiaroa Head, and is out of the track of vessels crossing the bar, but dangerous for small vessels hugging Taiaroa Head on that bearing.

“TIDES.

“It is H.W. F. & C., Taiaroa Heads at 2h. 50m.; in Koputai Bay at 3h. 30m.; at Dunedin at 4h. 30m. The rise of spring tides at the Heads

varies from 4 to 7, and sometimes 8 feet; at Port Chalmers, from $3\frac{1}{2}$ to 7 feet; at Dunedin from 4 to $6\frac{3}{4}$ feet. The greatest strength of the tide is off Harrington Point, where the ebb runs from 2 to 3 knots, the flood somewhat less; on the bar the greatest rate is 2 knots. At Port Chalmers the flood tide has an average duration of 6h. 5m., the ebb 5h. 35m.; at Dunedin the flood lasts 5h. 12m., the ebb 6h. 42m.

“The average interval of slack water at Port Chalmers is 25 minutes; at Dunedin, 17 minutes.

“The harbour should not be approached in a south-east gale, for these winds which set the heaviest sea in on the coast produce a frightful surf on the bar, breaking in five and six fathoms.

“The bar has been considered impracticable for shipping about forty days in the year, and during the winter months occasionally so for a fortnight consecutively.”—N.Z. Pilot.

“Only small craft and steamers should venture in at night, without a pilot, unless in case of necessity.”—Marine Department.

Coast from Otago to Nugget Point.—From Tairoa Head the coast runs S.S.-Easterly for nearly seven miles to Cape Saunders.* “Hydra Rock, northwards of Cape Saunders, is reported to lie in the following position, viz., with Cape Saunders S. by W. $\frac{3}{4}$ W., Funnel of Victoria (wreck in Wickliffe Bay S.W. by W. $\frac{1}{2}$ W., Womans Head (most easterly land near Tairoa Head) N.W. $\frac{1}{2}$ N. Its exact position has not been determined. Mariners are warned to exercise great caution when near the above position. As far as present information is to be depended on, a vessel will be clear inside the most westerly reported position of this danger, so long as Womans Head or East Head is shut in by Remarkable Cliff point, and will be clear outside the most easterly reported position so long as East Head is brought nothing to the north of N.W. $\frac{3}{4}$ W.”—Wellington Almanac. This bold and remarkable headland is the south-eastern termination of the peninsula which forms the southern side of Otago Harbour. Light on Cape Saunders: A *revolving white* light, 210 feet above the sea, is shewn from a white tower 28 feet high, visible between the bearings of S.W. by W., round by west, and north, to N.E. $\frac{1}{2}$ N., attaining its greatest brilliancy once every minute, and may be seen at a distance of about 21 miles in clear weather. From Cape Saunders the land curves away S.W. by S. towards Quoin Point, a rounded projection 30 miles distant. The intermediate coast forming a deep bight, is moderately high, in some parts thickly wooded.

Gull Rock, the outermost of a cluster, is nearly one mile off a cliffy head five miles S.W. of Cape Saunders. Nearly seven miles westward of Gull Rock, and a mile from the coast, is White Islet, and the same distance off shore, five miles further westward, is the small Green Islet. On the coast midway between these two islets is Black Head, a remarkable rocky head. Immediately within rises the Saddle Hill.

From Black Head the coast is low, curving with a shingle and sandy beach for 11 miles to Taieri River, navigable at its entrance for vessels of six to nine feet draught. Its north entrance point projects half a mile eastward, and is formed by a small island of the same name. The coast now rounds away six miles southward to Quoin Point, with rocky ledges extending half a mile off shore. Cook's Head, a remarkable rock on the beach, is four miles south-westward of Quoin Point.

Nugget Point, 22 miles from Quoin Point, the southern extreme of Molyneaux Bay, is a bold projecting headland, the termination of a razor-backed mountain ridge, with three pointed rocky islets nearly half a mile off it.

LIGHT.—The lighthouse on the extremity of the point, a white stone tower, 31 feet high, Shows a *fixed* white light, 250 feet above the sea, which in clear weather should be seen 23 miles.

Molyneaux Bay.—Anchorage in this bay with off-shore winds, in eight fathoms, about half a mile off the landing-place, and the same distance northward of Reef Point, which is little more than two miles N.N.W. of

* About one mile from the north point of Wickliffe Bay, which is midway between Tairoa Head and Cape Saunders, a reef, with less than six feet water on it, was reported in 1868.

Nugget Point, with a reef extending three-quarters of a mile from it. Coal is found in a cliff on the north side of this bay, seven miles from the mouth of the Clutha River. On either side of this river are extensive clumps of wood.

Clutha River (Matau), $4\frac{1}{2}$ miles northward of Nugget Point, is a considerable river with deep water, and broad within the entrance. A constant fresh running out at from three to five knots renders the narrow entrance unfit for anything but boats, when it must be taken at or near high water. ("The Clutha during a heavy flood in 1879 opened out a second entrance nearer Coal Point, which continues open still, the result being that the old entrance shoaled considerably, and, the river waters being now divided, both entrances are shallow and very dangerous."—Harbourmaster, Dunedin, August, 1880.)

CURRENT.—Between Cape Saunders and Nugget Point a current of one knot an hour is generally found to set northward.

SOUNDINGS.—The 100-fathom line of soundings extends 20 miles from the coast, decreasing gradually until two miles off, where there are 12 fathoms, sand. Large vessels are not recommended to stand in nearer than a league.

Coast from Nugget Point to Foveaux Strait.—From Nugget Point the coast trends S.W. by S. 14 miles to Long Point; thence S.W. by W. 11 miles to Chaslans Mistake; thence W.S.W. 14 miles to Slope Point. Southward from Nugget Point it becomes much broken with occasional islets and reefs (which, in the absence of any regular anchorage, prove of great benefit as places of refuge to boats engaged in whale and seal fisheries. It is not uncommon for whaleboats to make the passage from Stewart Island or the north shores of Foveaux Strait, to Otago, a distance of 140 miles, taking advantage of these boat harbours on the approach of bad weather, which on this coast is of frequent occurrence).

Three miles southward of Nugget Point is False Islet, connected with the main by a sandy neck.

Catlin River (see plan on sheet chart) is half a mile westward of False Islet, navigable for small vessels; the bar, on which is a depth of five feet at low water, breaks with a swell from N.E. to south. H.W. F. & C. 2h. 30m.; springs rise 8, neaps 4 feet; strength of tide, 2 to 3 knots, ebb and flood. The current flows in for 50 minutes after H.W. The township of Newhaven stands on the north bank of the river, half a mile inside the bar, where the channel is one third of a cable wide.

Two miles and a half from Catlin River is the small islet of Tuawike, close to the shore; inside is a boat harbour. White Head, a bold cliff, is $1\frac{1}{2}$ miles southward of it.

Long Point (*Irihuka*), the next headland, is similar to Nugget Point, but without the rock islets off it. Two miles north-eastward of it is Cosgrove Island, inside which there is landing in fine weather; abreast this part of the coast, two miles off shore, there is 25 fathoms fine sand, and from 50 to 60 fathoms at five miles off; coming from the northward, the influence of the Foveaux Strait tide begins to be felt here. The coast now trends more westerly.

Tautuku, a sandy bay, six miles long, sweeps round from Long Point; at its western extreme is the river of the same name, a rapid stream, with a bar dry at low water; there is anchorage off it in seven to nine fathoms, with westerly and north-west winds, but exposed to south-west; there is a boat harbour at the eastern end of the bay, sheltered by Long Point. A series of irregular hills with rounded outline, 1,300 feet high, rise over this part of the coast, diminishing northward both in height and ruggedness.

Chasland's Mistake (*Makate*), a remarkable black cleft cliff, is nearly 11 miles from Long Point, with a high rock standing off shore a mile north-east of it.

Brothers Point, with two rocky islets off it, is five miles westward of Chasland's Mistake, with a bight between, in the centre of which is a boat harbour, and another close westward of the point itself.

Waikawa River, with three fathoms on its bar at low water, but a very narrow entrance, and strong freshes always running out, is three miles westward of Brothers Point; just eastward of its entrance is a white bluff. Small vessels have laid secured to the shore within the river, but exposed to considerable danger from the freshes and swell from southerly gales.

From Brothers Point the coast decreases in elevation, and is backed by a range of undulating hills. The tide of Foveaux Strait slackens considerably off this part, and there is a longer stream to the north-eastward. Five miles westward of Waikawa River is Slope Point, the southern extreme of the South (Middle) Island of New Zealand; it is a low treacherous point, the sea breaks for more than one mile off it; a sloping mountain rises to 1,300 feet, seven miles northward of it.

WAIAPAPA POINT, $7\frac{1}{2}$ miles westward of Slope Point, is low and sandy; between Waikawa River and this point the coast is fronted with numerous rocky ledges, which render it imprudent for vessels to approach within a league; its exposed character and irregular tides render it also unsafe for boats, unless in very fine weather.

Waipapapa Point, the eastern extreme of Totoes Bay, slopes gradually down to the sea from a mountain summit, 14 miles north-east of it. The sea is said to break heavily at times five miles off this point, in seven and ten fathoms; it should therefore be approached with great caution.

Mataura River is five miles north-west of Waipapapa Point in the bight of Totoes Bay, with only two feet on the bar at low water.

Between Mataura River and Waipapapa Point, the Papanui, a mountain stream, runs into the bay through a line of cliffy heads. From Mataura River to the Bluff Harbour, 18 miles, the coast is a low sandy beach backed by an extensive plain, the hills terminating at the eastern bank of the river.

GENERAL REMARKS.—From Otago Harbour to Waipapapa Point, which may be considered the north-eastern entrance point of Foveaux Strait (a distance of about 110 miles), there are no dangers more than one mile off shore (except off Waipapapa Point, see above), and few which do not shew; neither are there any remarkable features by which the seaman is enabled to ascertain his exact position. Nugget Point, with its lighthouse, and Molyneux Bay are conspicuous landmarks; the latter shews as a deep bight from seaward, the land on either side being moderately high. Long Point, Chasland's Mistake, Brothers, Slope, and Waipapapa Points, though not remarkable, may, with the assistance of the chart, be recognised at the distance of five miles: the water shoaling gradually, within the 100 fathom line, 20 miles from the shore, will enable a vessel to judge her distance at night with tolerable accuracy.

FOVEAUX STRAIT, AND SOUTH OR STEWART ISLAND, INCLUDING THE TRAPS ROCKS AND SNARES ISLANDS.

VARIATION IN 1875.

Bluff Harbour - $16^{\circ} 40'$ East | The Snares - - $17^{\circ} 0'$ East.

Foveaux Strait separates the South (Middle) from Stewart Island, and lies in a W.N.W. and E.S.E. direction; the general width is 15 miles; from Ruapuke Island to the north-west end of Stewart Island, a distance of 30 miles, it has a depth of from 15 to 28 fathoms, sand and shells.

The approach from the eastward requires considerable caution on the part of strangers; the Ruapuke island lying nearly in the centre of the entrance, surrounded in almost every direction by islets, reefs, and tide rippings; but there is a clear passage on either side of five miles, with not less than twelve fathoms water; either may be taken as circumstances render desirable.

The northern shore of the Strait, from Bluff Harbour to the western end of Tewaewae Bay, nearly 50 miles, is studded with islets and reefs, some of which extend eight miles from the coast, and are not always visible; but westward of Ruapuke island there is a clear navigating width of never less than 10 miles.

CURRENT.—A current always sets southward round the south-west

extreme of the South (Middle) Island; once round this point, a south-west wind will carry a vessel in a short time into comparatively fine weather, but should a sailing vessel—her fair wind falling before rounding this extreme—be set back by the current, overtaken by a north-west gale, and obliged to bear up for Stewart Island—the wiser course, if the gale proves severe—after passing Saddle Point of Stewart Island, smooth water will be found, Port William always accessible, and anchorage anywhere off the coast between it and Saddle Point.

The passage through Foveaux Strait from the eastward cannot be recommended for any but steam vessels; but from the westerly winds so constantly prevailing, the passage from the westward could be accomplished with great rapidity in smooth water, and those ugly dangers, the *Trap*s Rocks, southward of Stewart Island, be avoided.

Solander Island—an excellent landmark to the strait to vessels from the westward—lies 22 miles south of the southward coast of South (Middle) Island, and W. $\frac{1}{2}$ S. 35 miles from the north-west end of Stewart Island: it is nearly one mile long, rises almost perpendicularly from the sea, and has a remarkable peaked summit 1,100 feet high, seen in clear weather 13 or 14 leagues; adjoining it a smaller islet lies little over one mile westward.

The only port on the northern shore of Foveaux Strait eligible for ships of burthen is the Bluff Harbour (*Awarua*); its narrow entrance and very strong tides render it difficult of access to sailing vessels.

On the Stewart Island shore are several ports always accessible and safe, where vessels may wait an opportunity of entering Bluff Harbour or New River.

Ruapuke Island (see sheet X.) lies nearly in the centre of eastern entrance of the strait, its north point being in a direct line between the low sandy Waipapapa Point on South (Middle) Island, and Port William in Stewart Island, from the former S. W. by W. 14 miles, and from the latter 19 miles. It is low, of an irregular shape, $4\frac{1}{2}$ miles long, north and south, and two miles wide, and may be seen 12 or 14 miles; the central part is 140 feet high, covered with trees of stunted growth; the north point is a cliffy headland, with a hummock over it 220 feet above the sea. The principal dangers lie off the eastern side of the island.

GREEN ISLAND, $1\frac{1}{2}$ miles round, 190 feet high, has a level outline. It lies one mile east of Observation Head, the eastern cliffy point of Ruapuke; between them is the anchorage.

The **SEAL ROCKS**, north-eastward of Green Island, are high out of water, the dry part covering a space of two cables; reefs awash extend from them westward nearly three-quarters of a mile, and south-eastward four cables; between them and Green Island is a clear passage of three-quarters of a mile, with from 9 to 15 fathoms. A bank, with $3\frac{1}{2}$ fathoms least water, which breaks in heavy weather, lies midway a little northward of a line between them and the north head of Ruapuke.

TOBY ROCK, *dangerous*, is only awash at very low springs, and not marked by kelp (as most of the dangers here are); it lies directly in a line with the north end of Green Island, and the high part of the Seal Rocks, N. N. E. $\frac{3}{4}$ E., $1\frac{1}{2}$ miles from the latter, and E. by N. $\frac{3}{4}$ N. $3\frac{3}{4}$ miles from the north head of Ruapuke Island. Captain Thomson, Harbour Master, Bluff, reports heavy breakers having been seen in three places, N. Eastward of Toby Rock, with probably not over four or five fathoms—perhaps less—on them. The northernmost breaker bore from Bluff Hill S. 88 East, from Dog Island S. 87 E., from Toby Rock N. 29 E., two miles; until this locality has been surveyed, it should be approached with great caution.

DIRECTIONS AND ANCHORAGE.—Vessels from the eastward, intending to anchor at Ruapuke Island, should pass five or six miles southward of Waipapapa Point, abreast of which the island will be generally visible. Green Island and the Seal Rocks will be plainly made out six or seven miles off, when steer direct for the former, which leads clear of all dangers. When within half a mile of Green Island haul round the northern point, giving it a berth of a quarter of a mile in 11 fathoms, and anchor midway between it and Lee Islet—close off the north-east sandy point

of Ruapuke—half a mile from either in $5\frac{1}{2}$ fathoms sand. Vessels should not go within this, as several rocks and reefs, marked by kelp, extend half a mile from the beach, and break in bad weather. Weather Islet lies half a mile south of the anchorage, midway between Green Island and Observation Head.

With westerly or south-westerly winds this anchorage is safe, with smooth water; with strong southerly winds a swell rolls in. The Seal Rocks and Reefs, with Green Island, protect it in a measure from easterly winds, but with these winds better anchorages can be found in the bays on the west side; the excellent harbours of Stewart Island being so near, there is no inducement for a vessel to ride out a gale here, unless in actual necessity.

From this anchorage there is a passage to sea between Seal Rocks and Ruapuke, passing half a mile from Lee Islet, and between it and the $3\frac{1}{2}$ fathom bank mentioned above. A heavy tide race extends a quarter of a mile off the north head of Ruapuke; it is otherwise free from danger.

LANDING.—The landing for boats is close round the Observation Bluff.

BREAKSEA ISLES, two in number, surrounded by rocks, lie 1 mile south of Green Island. Two reefs above water or awash lie a short distance westward and south-westward of them.

The three rocky South Islets extend half a mile off the south point of Ruapuke.

Kelly Rock (not marked by kelp) only breaks occasionally, and lies nearly a mile S.S.E. of the south extreme of South Islets, and $1\frac{1}{2}$ mile E $\frac{3}{4}$ S. from a remarkable black rock, the easternmost of the Hazelburgh group.

Outlying Islets and Rocks.—Between the south and west points of Ruapuke Island is Henrietta Bay, off these points, extending for a distance of four miles in a semicircular form, are Hazelburgh group, Half-passage and Fife Rocks, and Bird Island, with several smaller patches inside and among them, which generally break; vessels unacquainted with the locality, should not go within them.

Henrietta Bay.—The channel between Hazelburgh group and South Islets appears to be clear, but in hauling into Henrietta Bay the islets at its southern entrance should not be rounded too close, the rocky patch on their north side appearing to extend further north-westward than shown on the chart.

There is at the south-east corner of Henrietta Bay a well sheltered landing place.

The north-western side of Ruapuke Island is free from dangers, with the exception of Tupis Island, close off West Point, and a small islet half-a-mile off the west point of Caroline Bay.

Caroline Bay, on the north-west side of the island, is $1\frac{1}{2}$ miles south-westward of the north head, with a depth of six and seven fathoms; there is a large kelp patch in the centre with three fathoms inside it.

Although Ruapuke Island has so many dangers near it, Toby and Kelly Rocks alone do not show; a strict look-out, however, is indispensable to ensure the safety of vessels in its vicinity, and, unless intending to anchor, it is recommended not to approach it within four miles, except on its north-west side, and towards the north head, where it may be safely approached within half that distance.

A mile eastward of Toby Rock, the easterly or flood stream commences three hours after it is low water by the shore, or at 10h. 0m. F. & C.; like the westerly, it is of six hours' duration, running at the rate of one to one-and-a-half knots.

TIDES.—The flood sets through Foveaux Strait from west to east, and is strongest between Bluff Harbour and Ruapuke; it is felt as far as Long Point, 45 miles eastward of that island. Between Ruapuke and Stewart Islands it sets south-eastward. The ebb takes contrary direction.

It is H.W. F. & C., in the western entrance of Foveaux Strait, between Stewart Island and Pahia Point, at 12h. 15m.; the flood stream commences from half an hour to two hours after low water, according to the winds, earliest with those from the westward.

At the eastern entrance it is high water at 1h. 0m., the flood stream commencing at 10h. 0m., or three hours after low water.

Along the north-east side of Stewart Island the flood or south-easterly stream runs for an hour and twenty minutes after it is high water at Port William, or until 2h. 0m., F. & C. The strength varies from a half to 2½ knots; in the narrow part, between Ruapuke and the Bluff, it is 3 knots.

WINDS, &C.—The prevailing winds on the southern coasts of New Zealand are from north-west to south-west; ordinarily in Foveaux Strait, what would be no more than an ordinary gale or strong breeze a hundred miles at sea, blows through them with increased violence. The contrary, however, occasionally happens, and outside Solander Island it will be a strong gale, when within it, and near the mouth of the strait, the weather is quite moderate.

The fall of the barometer indicates a north-west wind, and frequently dirty rainy weather; these gales blow with great violence, generally for four or five days. Thunder, which is uncommon, is said to be a sign of unusual duration; it frequently continues to blow very hard after the mercury has risen, with a high barometer, the wind then generally veers southward of west. With a strong westerly or north-westerly wind in the straits, it is often south-west on the eastern shores of Stewart Island, while on the western coasts the north-west wind generally draws from N.N.W., or more northerly.

A casual north-east or easterly wind, with fine weather, in the eastern entrance, almost certainly turns to north-west as the western entrance is approached. The only wind to be depended upon to carry a vessel through is a south-easterly, which may be looked for, during summer, about once in six weeks. In the winter season it perhaps occurs twice in that period. It generally lasts from 24 to 48 hours, more than sufficient to carry a vessel round the south-west extreme of the South Island into comparatively fine weather. It is frequently a south-west wind, with fine weather, northward of the West Cape, while blowing a north-west gale, with dirty weather in the strait.

The barometer rises before south-east winds, which often blow with great strength. A thick bank of clouds rising to the south-east, with rainy weather, and the hills clothed with white mist, are considered as certain indications; as also the groups between Ruapuke and Stewart Island raised by refraction; but on going westward, should Solander Island appear distorted a westerly wind will certainly terminate the easterly.

ASPECT OF COUNTRY.—The headland immediately over the entrance of the Bluff harbour forms a conspicuous feature, contrasted with the great extent of level land in its vicinity, and may be said to be to the eastern entrance what the Solander Island is to the western, a useful and unmistakable land-mark. It stands at the south-east extreme of a narrow and irregular promontory, forming the Bluff harbour on its southern side, and the entrance to New River on its northern.

From the summit, which is 855 feet above the sea, there is a full and clear view of the strait and its islands and reefs. Solander Island can be seen westward, as also the coast of South Island for 60 miles, as far as Big River. Sixty or 80 miles inland northward is the southern portion of the Lake Country, with lofty ridges 5,000 to 7,000 high.

Bluff Harbour (Awarua—see plan) stretches in two arms to the north and east at high water respectively four and five miles. The available space for anchorage, however, is narrow and confined, and, for vessels of large tonnage, not extending much above a mile from the entrance. The tides run very strong, during the springs as much as seven knots; there is also a heavy tide rippling at the entrance, caused by the meeting of the harbour tide with that in the strait. The entrance to this harbour (which is now much frequented by the mail steamers) has been buoyed, as also has the harbour itself. It is becoming a port of considerable importance.

The following observations upon the navigation of Foveaux Strait are by Captain Thomson, Harbour Master at Bluff Harbour:—

“FOVEAUX STRAIT FROM THE WESTWARD.—Vessels from the westward, bound to Bluff Harbour, should endeavour to make the Solander, which is in a very favourable position for a landfall, then steer for the

entrance of Foveaux Strait.* Codfish and Rugged Islands—off N.W. end of Stewart Island—are high and conspicuous, and during hazy weather can often be seen before the still higher main of Stewart Island. Should it be blowing hard from the westward, or night coming on, they should haul close in with the land at Saddle Point—N.E. part of Stewart Island—; it is easily distinguished by its name, and between it and Port William perfect shelter will be obtained, with smooth water and safe anchorage. The best is abreast of Murray River, from a half to a mile off shore, in from 5 to 12 fathoms. The only outlying danger is the Newton Rock, about three miles N.W. from Port William, and about a mile from the nearest land; has only six feet over it, but good anchorage all round. After having made out the land, masters need have no hesitation in taking Foveaux Strait during the heaviest gales, as the above shelter is extensive, and a vessel may either anchor or dodge under the island with perfect safety, with, when clear, Dog Island light in sight.

“I would recommend anchoring as safest, giving ample scope of cable on one or both anchors if necessary. There need be no apprehension of the wind coming suddenly on to the land and preventing them from getting their anchors, as it invariably moderates before any change takes place, and seldom blows on to the land with any strength.”

“In working through Foveaux Strait, a vessel should not stand northward into less than 20 fathoms between Pahia Point and Bluff Harbour to avoid the reefs in the neighbourhood of Centre Island (see p. 162); this leaves a clear working width of ten miles, but it is not recommended to approach within three miles of White Rocks or Rugged Island at the north-west end of Stewart Island, on account of the heavy westerly swell and tide rippings met with there. Midway Reef in Tewaewae Bay on the north shore must also be avoided; it lies in a line between the points of the bay, $4\frac{1}{2}$ miles from the Western Sand-hill Point, and only breaks occasionally.”—N.Z. Pilot.

“When moderate they should steer for the Bluff, which lies about N.E. $\frac{1}{2}$ E., 15 miles from Saddle Point, and is the highest land in that direction, and communicates with the Signal Station on the hill, from which notice is given to the Pilot Station; when the pilot is on his way out, ‘M.C.S.’ is shown, ‘Stand in for the pilot and look out for his signals.’ The vessel should then be steered round the land from Look-out Point, about two cables’ length off, under easy sail till the pilot boat is seen. When blowing fresh, the vessel’s way should be deadened as much as possible by ‘bracing by the yards’ to allow the boat to get alongside, as there is not room for a large vessel to round-to between the sand-spit and the shore. A range of 15 fathoms should be overhauled on each cable, and, if the sea will admit, both anchors cock-billed when a mile or two out to avoid delay.

“Vessels requiring a pilot should on no account run in for the port without first having communication with the Signal Station on Bluff Hill, or when it is clouded, with the station on Starling Point, which opens on a N. by E. bearing; the latter should only be done during westerly winds, on the ebb. On the flood and westerly winds, vessels should keep well to the westward, but within signalling distance of Bluff Hill Station, and keep working to windward until ‘M.C.S.’ is shown, otherwise they are liable to get set past the port.

“When the wind is south or south-easterly, Starling Point should be brought to bear about north, with a good offing, and steered in for on that bearing till the pilot boat is seen, care being taken to keep a little to the eastward or westward, to counteract the set of the ebb or flood as the case may be. There are two white triangular beacons on the north shore which serve this purpose when kept in a line about N. by E.; but vessels drawing over 14 feet, which do not take a pilot, should haul up for Tewaewae Point, before they come abreast of Starling Point, as the line of beacons above this leads into $2\frac{1}{2}$ fathoms at low water. The northern beacon has a small triangular top.

“There is a semaphore on the flagstaff on Starling Point; when it is

* The light on Centre Island (see page 162) is now at night time the chief guide for making the Strait from the westward.

shown, the vessel's head should be altered in the direction the arm points, and steadied when the arm is dropped. It will not be used for piloting large vessels into harbour, but may be shown should a vessel by any chance be running into danger.

“There is a red buoy marking the S.W. end of the sand-spit in six fathoms; it bears from Dog Island about W.N.W.; from Starling Point, S. by E. $\frac{1}{2}$ E.; and from Look-out Point, E. by N. The channel is between it and the shore.

“FOVEAUX STRAIT FROM THE EASTWARD.—Vessels coming from the eastward along the coast should pass about three or four miles off Slope Point; when abreast it Bluff Hill will look like an island (bearing about west) till the low land north of it appears. Waipapapa, $7\frac{1}{2}$ miles west of the Slope, is a low sandy point with detached rocks, and should be passed at the same distance off, as foul ground is said to extend from it two or three miles. The Seal Rocks, Toby Rocks, and a dangerous break two miles outside the latter, lie in a line about N.E. by N. $\frac{1}{2}$ N. from Green Island, the break being distant $4\frac{1}{2}$ miles. To clear these dangers Dog Island should not be brought to bear to the north of west till Green Island bears S. by W. $\frac{1}{2}$ W. After passing these, a course may be shaped for any part of the Strait to the westward, or for the Bluff, as hereinafter directed. ‘Allowing for the streams of tide which here run east and west (true) about one knot an hour.’—N.Z. Pilot. Vessels requiring a pilot should not run in for the port during the night or when blowing hard between east and south, especially on the ebb, as then there is a heavy ‘tide-rip,’ and the pilot may not be able to put off. But on the first of the flood they may run down, either north or south of Dog Island, till within signalling distance of Bluff Hill, or Starling Point Stations, and ascertain whether the pilot can put off or not; if not, they may dodge between the Bluff and Stewart Island till moderate or stand across for Port William, which is easily entered at such a time, and by keeping the Bluff Hill on a N. by E. $\frac{3}{4}$ E. bearing, they will be led right into it. The 10-foot patch which lies in the entrance of that port is well marked by kelp, and it may also be avoided by keeping close to either the south or north head of the bay.

“Vessels passing between Dog Island and the Sand-spit should give the island three-quarters of a mile berth, and steer about W. by S., not bringing Look-out Point to bear southward of west till Starling Point bears north; then, if bound for the Bluff, and ‘M.C.S.’ is shown, steer in as before directed with southerly winds.

“During moderate weather, and the wind between north and south, round easterly, the north passage should be taken, and after passing Waipapapa, a course steered about W. by N. for the sandy beach about three miles eastward of the harbour, till within half a mile of the shore, when a black buoy will be seen, which marks the N.E. end of the sand spit; it is moored in five fathoms, bearing from Dog Island N. by W. $\frac{1}{2}$ W., from Bluff Hill Flagstaff, E. by N. $\frac{3}{4}$ N. The north passage is between this buoy and the shore. While waiting for a pilot keep to the eastward of this buoy, or do not close Bird Island with Dog Island. There are also two white triangular beacons which lead through this channel. These, if seen before the buoy, should be brought in a line about W. by N., and will lead close to it. When the wind is easterly, and ebb tide, allowance should be made for not getting set to the westward of this. The western beacon has a small triangular top to distinguish it. The northern passage should not be taken by vessels drawing over 15 feet, near low water, nor when there is a heavy swell on.

“When the wind is between north and south, round westerly, vessels should beat to the westward, outside of Dog Island, till off Look-out Point; then follow the directions before given for vessels from the westward.

“Vessels coming from the southward, on the east side of Stewart Island, should take the passage between Fancy Group and Half-Passage Rocks. It is clear of hidden dangers, and well defined; the islands being of moderate height and the rocks large and well above water. The tides set S.E. and N.W. from one to three knots. Bruce Reef, laid down off Port Adventure, is not known to any local men who have been a great many times

over this ground, nor to the Maoris living near, but some say that after heavy southerly gales it occasionally breaks somewhere in this locality.

"The harbour can be taken at any time of tide, with the wind from N.N.E., round easterly, to S.S.W. With all other winds, there is perfectly safe anchorage both south and north of Starling Point, about two cables from the shore, in from six to eight fathoms, good holding ground. Vessels having only passengers to land need go no farther than this. There is a red light shown on Starling Point between sunset and sunrise, 20 feet above sea level.

"Masters with a sheet chart of Ruapuke may find good shelter from westerly wind on the east side of that island; they should haul close round the north end, which will enable them to see their position clearly.

"Vessels may, in fine weather, drop their anchors or a kedge in any part of Foveaux Strait (where the water is not too deep) to prevent them from being drifted about by the tides.

"It is H. W. F. & C. at Bluff Jetty at 1h. 20m. The current runs in one hour after high, and out one hour after low water. In the middle of the Strait the flood stream runs eastward two hours after high water, and the ebb westward two hours after low water.

"The channels are marked by red and black buoys; when entering red buoys are to be left on the starboard hand and black on the port.

"There is an excellent wharf with 20 feet alongside at low water, and no range or swell whatever sets into the harbour. Railway trucks come alongside to load and discharge cargo.

"I may here state that among those unacquainted, a needless dread of Foveaux Strait exists, in consequence of the prevalence of westerly gales, but they are not much more frequent than in many places on the same parallel of latitude in both hemispheres, and have this advantage—that they are seldom accompanied by thick weather or fogs, and there are but few straits where such perfect shelter, with ample room and safe anchorage, is so easy of access, and can be so readily obtained as under Stewart Island.

"The local whaling vessels invariably take shelter under Stewart Island, and when it moderates seem to have no difficulty in getting to the westward to their whaling ground off the Solander.

"The light on Centre Island greatly facilitates the navigation of these straits.

"A floating light, showing 'bright all round,' has been placed on the Black Buoy Rock, with the following bearings, from the Light:—Burial Point, S. by E. (2) two cables' lengths; Triangle Rocks (sunk) S.S.E. ($\frac{3}{4}$) three-quarters of a cable's length; Red Light, on the east end of the Jetty, west, (3) three cables' lengths. It is moored in 18 feet at low-water spring tides, and must be left on the *port hand* when entering. ('Vessels drawing over 12 feet should not come to the south of a line between the Light Vessel and the northern face of the Jetty at low water. There is 13 feet close to the vessel at low-water springs.'—'New Zealand Gazette.')

"BLUFF HARBOUR.—Two dolphins have been placed on the 'middle spit' (which lies to the north of the wharf), between the two channels. One is on the extreme east end in 12 feet, surmounted by a cross, painted red and white, in horizontal bands. The other on the middle of the spit, in four feet, surmounted by a Y-shaped beacon, painted red and white in diagonal bands. These, when kept in line about N.W. by W. $\frac{3}{4}$ W., lead through the deepest of the channel, in not less than 24 feet, from the red cone buoy with staff and ball, till abreast the lightship.

"The sandy knoll on the Admiralty charts about three cables north-east of Starling Point, with two fathoms marked on it, has disappeared; there is now $3\frac{1}{2}$ fathoms in that position.

"The knoll, two cables' length south of Tewaewae Point, marked three fathoms, has shoaled up and extended about $1\frac{1}{2}$ cables to the south; there is only $1\frac{3}{4}$ to 2 fathoms over the whole area. A chequered buoy, black and white, has been placed on its north-west end, and a red buoy on its south-east, both in three fathoms. When entering by the west channel the buoys must be left on the starboard hand, and on the port when entering by the north channel.

"There is not less than three fathoms to the south-east of the knoll,

within a line between the outer red buoy in the west channel and the inner black buoy in the north channel.—THOMAS THOMSON, Harbourmaster.

“Bluff, 8th March, 1880.”

The best time for a large steamer or a sailing vessel with a fair wind to enter is at high water or first quarter ebb; but sailing vessels during westerly winds should be at the heads at half flood.

No information has been received as to the position of the buoys.

The Bluff or western shore must be kept on board within less than two cables by vessels coming from the westward, as an extensive bank with shoal water lies off the entrance, leaving a passage of one-third of a mile only between its western end and the Bluff coast, with from five to nine fathoms water.

Anchorage off Starling in westerly or northerly winds is safe and convenient; but with strong southerly winds a vessel should run higher up.

Large vessels intending to make any stay should anchor one mile above Starling Point, within $1\frac{1}{2}$ cables of the western shore, in four fathoms. After passing this point a mid-channel course may be steered between the two entrance points. There is a patch of rocks in the narrowest part of the channel, more than a cable from the western shore. The line of shoal water on either side is marked by kelp, which, however, during the strength of the tide is run under. The upper anchorage is secure in all winds.

Dog Island lies $2\frac{1}{2}$ miles S.E. by E. from the entrance of Bluff Harbour. It is low, and three quarters of a mile in extent. The sea breaks heavily for some distance off its northern and eastern sides. There are two sunken rocks near Dog Island. One lies a quarter of a mile from the west end of the island, with the lighthouse bearing S.E., and has only two feet on it at low-water springs. The other lies a quarter of a mile from the east end of the island, with the lighthouse bearing W. by S., and is awash at low-water springs. Captain Thomson also reports seeing breakers in several places from one to three miles north-eastward of Dog Island. Until this locality has been surveyed, vessels should approach it with caution.

LIGHT.—A lighthouse is erected on Dog Island, showing a *revolving* white light, attaining its greatest brilliancy every *half minute*. It is 150 feet above the sea, and in clear weather should be seen 18 miles.

The tower is of gray stone, 118 feet high from base to vane.

From the Bluff, the coast trends N.W. by W. 8 miles, to Steep Head, with two rocky bights. Steep Head is a black, cliffy headland, with a rocky islet off it, and forms the southern entrance point of New River.

New River—see plan—(*Orele*) is accessible in moderate weather, at high water, for vessels drawing 13 to 15 feet water; but from the exposed and shifting nature of the bar, and channel within, as also the rapid tides, it is essential that a stranger should be guided by the information obtained from the signal station. A semaphore arm on the mast is used.

The south or outer entrance point is well marked by Steep Head and Point Islet; the northern is low and sandy. A shifting bar, with 9 and 10 feet at low and 16 feet at high-water ordinary springs, runs across from Steep Head to an extensive bank of sand, extending from the North Point, which covers at half tide; the bar is narrow, and the water deepens within to four and five fathoms, till the Bombay Rock—four feet above water—is reached.

DIRECTIONS.—Vessels bound for New River should not approach to within $\frac{1}{2}$ of a mile westward of Point Island, as a sunken rock lies some two cables off it in that direction (see chart), then steer for a spiral-shaped *black* buoy outside the bar, in six fathoms, bearing from the north end of the island north, half a mile. As the buoy is approached the leading *white* beacons will come on, bearing E. $\frac{3}{4}$ S., keep them in one (leaving the *black* buoy on the port hand) to cross the bar, its breadth is about a cable, inside in four fathoms is a spiral-shaped *white* buoy marking the south side of the channel; keep between the white buoy on the starboard, and black on the north side. “A sunken rock—Guiding Star Rock—with five feet on it at low water springs, lies two cables S.W. $\frac{1}{2}$ S. from Bombay Rock. Abreast it a *white* buoy is placed, which should be passed on the starboard hand going in. If the buoy be away, do not bring Bombay Rock to bear the northward of N.E., till passed.”—Wellington Almanac.

The Bombay Rock is $1\frac{1}{2}$ miles inside Steep Head; the width of the river here is from three to four cables. The general course is E. $\frac{1}{2}$ N. gradually hauling up N.E. as the rock is approached; passing north of it, anchorage may be had in three fathoms at low water, a long cable from the northern shore, with the low sand hills of the north entrance point bearing W.N.W.

Compared with the Bluff Harbour as a port for shipping, it has the advantage of access to the interior, while the tides are not nearly so strong; the Bluff, however, is a better port, and being without a bar, is accessible for vessels of any tonnage.

INVERCARGILL, on the plains of the Bluff, is eight miles within the entrance of New River, and is rapidly rising in importance.

The Coast Westward of New River trends in a long sandy beach to the north-west, 15 miles, when it curves round to Howell Point, forming a shallow bay within it, in which, a mile and a half north-west of the point, is the entrance of Jacob's River, the bar of which is nearly dry at low water; but vessels of seven or eight feet draught enter at high water. There is anchorage in Howell Road one mile off the river's mouth, where vessels may wait for the tide, to enter, but should not lie in southerly or easterly winds.

From Howell Point the coast trends W. by S. $\frac{1}{2}$ S. 10 miles to a projecting rocky point (Wakaputa). Midway between, at the western end of a sandy bay, a small stream runs down, with a boat harbour at its mouth. From Wakaputa, a rocky and indented coast trends north-west six miles to Pahia Point, the eastern extreme of Tevaewae Bay.

DANGERS.—The northern shore of Foveaux Strait, from New River to Pahia Point, a distance of 25 miles, is fronted with numerous detached reefs and rocks, in some cases as far as eight miles from the coast. Centre Island, which lies nearly at their outer or southern boundary, is a good guide for avoiding them.

Centre Island is of triangular shape, moderately high, and three-quarters of a mile long. It lies four miles south-east from Wakaputa Point, and W. $\frac{3}{4}$ N. 22 miles from the Bluff, and has a sunken rock (the Hapuka) a little more than one mile south-west of its centre. Midway between it and Wakaputa Point are two extensive reefs awash, with a high rock on the east end of the southernmost one. A *fixed white* light (seaward of dangers, excepting the Hapuka Rock), 265 feet above the sea, is shown from a white tower 20 feet high, on the southern extremity of Centre Island, as follows, viz. (the bearings are towards the light):—*White* from N. 78 W., round northward, to S. 82 E.; *Red* from S. 82 E. to S. 54 E. (over Pahia Point); then obscured to S. 4 E., when again *Red* to N. 78 W., when it intersects with the *White* light as above. The *White* light should be seen in clear weather 22 miles. Its intersection with the red arcs leads southward of the Escape Reefs to the eastward and the Fish Reef to the westward of Centre Island. Vessels should therefore be careful to keep well within the *White* light when in their vicinity.

Fish Reef lies three miles south-westward of Wakaputa Point, and $4\frac{1}{2}$ miles W. by N. of Centre Island. Is an extensive patch, and breaks. It has 26 fathoms close outside it.

Escape Reefs, the most southerly of the many dangers on this coast, are four miles eastward of Centre Island. They are two detached reefs lying W. by N. and E. by S. of each other, and $1\frac{1}{2}$ miles apart. Each has a solitary rock about 20 feet above the sea. The eastern reef is four miles E. by S. from Centre Island, north 12 miles from the north point of Stewart Island, S. by W. $\frac{1}{2}$ W. $7\frac{1}{2}$ miles from Howell Point, and W. $\frac{3}{4}$ N. 18 miles from the Bluff. N.N.E., about one mile from each of the Escape Reefs, lie two other reefs awash.

Fig Island, a low round island, lies $2\frac{1}{4}$ miles S.W. by S. of Howell Point, with a sunken rock half a mile south-eastward of it, and two reefs awash between it and the shore.

Half-way Rocks, two rocks standing well out of the water, nearly three-quarters of a mile apart, in a north-west and south-east direction. The south-easternmost bears N.W. by W. four miles from Steep Head, and is

$3\frac{1}{2}$ miles off the Sandy Beach. A mile inshore of them are two other rocks awash, between which and Half-way Rocks are seven fathoms water.

Doubtful Rock only breaks in heavy weather. Its exact position is doubtful, but is placed on the chart bearing from Steep Head of New River W. $\frac{1}{2}$ N. $7\frac{3}{4}$ miles; from Howell Point S.S.E. $5\frac{1}{2}$ miles, and from the southernmost of the Escape Reefs N.E. by E. $\frac{1}{2}$ E. four miles.

CAUTION.—There is deep water among and between many of the above dangers. They should be therefore approached with caution, and avoided in thick weather. Vessels are recommended not to pass within the 20-fathom line on this part of the coast, and to keep three miles southward of the Escape Reefs and Centre Island; and between Wakaputa and Pahia Points not to approach within four miles.

Tewaewae Bay, westward of Pahia Point, is a square-shaped bay 7 miles deep. Sandhill Point, its western extreme, bears W. $\frac{1}{2}$ S. 15 miles from Pahia Point. Several detached rocks and reefs extend one mile off it, at two miles from the shore 16 and 18 fathoms will be found; two miles northward of this point is Mussel Beach, a small cove off which there is good anchorage in five fathoms, with all westerly winds, even as far round as south-west, but a heavy swell sets in with the wind in a more southerly quarter.

There are two rapid barred rivers in the north-west, and north-east corners of the bay.

Mid-bay Reef is treacherous, lying in a direct line between the points of Tewaewae Bay, and four miles from Sand-hill Point; in moderate weather only occasionally shows, and has 12 fathoms all round; the soundings in the bay range from 15 to 5 fathoms, in southerly and heavy south-west gales it breaks all over.

Coast from Tewaewae Bay to Puysegur Point.—From Sandhill Point the coast trends a little southward of west, 24 miles to Green Islets, with a low rocky outline. A constant surf breaks on it.

Six miles eastward of Green Islets is Patupo, or Big River; its mouth is fronted with numerous rocks, inside of which is a small place of refuge for sealing boats—Price's boat harbour—Green Islets, a small cluster of that colour with some rocks, fronting the shore, point out the locality.

From Green Islets the coast curves back, trending W $\frac{1}{2}$ S. seven miles to Windsor Point, and N.W. $\frac{1}{2}$ W. three miles to Puysegur Point, the south-west extreme of South Island. One-third of a mile off this latter remarkable low sloping projection lies Marshall's Rock; it is large, flat-topped, and a conspicuous coast feature. Boats pass inside it in fine weather.

STEWART ISLAND

Possesses, on its eastern and south-east sides, several excellent ports, affording every facility for shipping.

The island is of an irregular triangular shape; its western or longest side runs in a north and south direction 39 miles, its north-east and south-east sides are 33 and 30 miles long; its greatest breadth is little over 20 miles. It is mountainous and thickly-wooded, with timber adapted to ship-building and other purposes. An irregular ridge of which Mount Anglem, 3,200 feet above the sea, is the highest, runs in an east and west direction near the north coast of the island; in the centre between the head of Paterson Inlet on the east side and Mason's Bay on the west, rises a remarkable dome-shaped mountain (*Rakeahua*), 2,110 feet high, which in clear weather may be seen from nearly all points. The south end of the island is also hilly, though not so high as the north. Finger and Lees, bare granitic peaks, rising from the flat land north of Port Pegasus, are very remarkable. The coasts are studded with numerous islets and rocks, worn and crumbling from the sea which incessantly breaks on them.

Saddle Point is a low projecting point, the end of a spur from Mount Anglem, lying three miles south-west of it. From the Bluff it bears S.W. $\frac{1}{2}$ W. 15 miles. It forms the breaking point of the westerly swell in Foveaux Strait; after rounding this point, however hard it may be blowing from the westward, shelter, with comparative smooth water, is immediately met with. From Saddle Point the coast trends S.E. $\frac{1}{2}$ E. $8\frac{1}{2}$ miles to the entrance of

Port William; midway between, at the northern end of a sandy bay, is a small stream, the Murray River, the entrance to which forms a good boat harbour.

A clean sandy beach of $1\frac{1}{2}$ miles in extent, with a small portion of level land within, extends to the south-eastward of the river. The best anchorage is off the northern end of the beach, which is in a measure protected from any north-west swell by a projecting rocky head: a vessel, however, should run for Port William, if the wind veers to north-west and blows hard—as it almost invariably will from that quarter,—though a strong north-west wind in the strait is frequently southward of west on the Stewart Island shore.

In moderate weather anchorage may be had along the whole line of coast between Saddle Point and Port William, one mile off shore.

GULL ROCK, a white rock close to the shore, $3\frac{1}{2}$ miles north-west of the west head of Port William, forms in appearance the south-east head of Murray River sandy bay.

NEWTON ROCK, a dangerous sunken rock, lies E. $\frac{1}{2}$ N. one and one-tenth miles from Gull Rock, N.W. $\frac{3}{4}$ W. two and three-tenth miles from the west head of Port William, and a long mile from the nearest land; it has six feet on it at low water, is not marked by either break or tide ripple, and, lying directly in the track of vessels between Saddle Point and Port William, must be carefully avoided. There is a passage of 10 fathoms between it and the shore, and the same depth close round; small vessels generally pass inside. Leaving Port William, a N.W. $\frac{1}{4}$ N. course leads half a mile outside; when Gull Rock bears W.S.W. a vessel may haul up for Saddle Point. E. by S. $\frac{3}{4}$ S., about $1\frac{1}{4}$ miles from Newton Rock, and N. by W. $\frac{1}{2}$ W. $1\frac{1}{4}$ miles from the S.E. extreme of the west head of Port William, is a rocky patch with four fathoms water on it.

Port William (see plan) is an excellent little port, and although apparently open for a large vessel to anchor in, it is sheltered from easterly winds by the groups of islands and rocks between it and Paterson's inlet; and is a perfectly secure haven. It may be known by the bearing of the Bluff, which is N.N.E. 16 miles from its west head; it is also W.S.W. six miles from the most northern of the group of islands immediately off it. Approaching from the northward, a remarkable white sand patch will be observed three miles westward of the entrance, or just southward of Gull Rock.

The position of Port William, with regard to the Bluff Harbour, must always render it a port of value. Schooners engaged in whaling and sealing make it their head-quarters, and hauling into the northern head of the port are perfectly land-locked; large vessels lie further out, with the Bluff just shut in with the entrance point.

PENDER ROCK, the only danger in running into Port William, is a 10 feet rock, three cables E.S.E. from West Head, well marked by a long kelp patch, which also serves to break the swell with easterly winds.

WOOD AND WATER may be had in abundance from a bay and river at the southern head of the port.

Two to three miles off the coast from Port William to Paterson Inlet, lie the groups of islands and rocks above mentioned; there is a good ship channel of 20 fathoms, one mile wide, between Bench Island—the southernmost—and the groups northward of it. The smaller islands are barren craggy rocks, with strong tides and heavy rippings among them; it is not advisable in working to stand close to them.

FISH ROCK, little more than one mile eastward of the east head of Port William, midway between it and the groups of islands which lie off, is 30 feet high, with deep water close to, and tide rippings generally round it.

HORSE SHOE AND HALF MOON BAYS, two small bays immediately southward of Port William, much frequented by whalers, afford good anchorage with off-shore winds in five and six fathoms. Half Moon Bay, the southernmost, has a rock above water nearly in the centre, with a patch of nine feet a short distance within it. N.E. by E., nearly three cables from the southern point of Half Moon Bay (Akers Point), is the Barclay Rock, awash at low water; there is a passage for small vessels between it and the shore.

Paterson Inlet (see Plan).—The entrance to this spacious port, four miles south-eastward of Port William, lies between Akers and Anglem Points, nearly north-west and south-east, two miles apart. It runs in a westerly direction for a distance of ten miles, with a width in some parts of more than a league; bounded on its northern and southern sides by high irregular land; a flat valley runs through the island from its head, down which the westerly gales rush with great fury; ships should seek shelter in one of its numerous coves rather than anchor in its open waters.

Native Island, one mile southward of Akers Point, is almost connected with the main land by reefs; it extends to the south-east for three-quarters of a mile, and narrows the entrance of the inlet to about the same width. Anglem Point is the north extreme of a remarkable peninsula, three miles long (which protects the inlet from easterly winds); it is almost divided in three places by narrow necks of land; the middle, known as the Old Neck, is merely a low sandy beach.

DIRECTIONS.—Entering Paterson Inlet from northward pass inside the group off Port William, on either side of Fish Rock. Approaching from southward, take either the Carter Passage between Anglem Point and Bench Island—the southernmost of the group, with two remarkable rocks, the Twins, off its south-east extreme—or Abbot Passage, between Bench Island and Fancy Group; if the former, Passage Islet, with a reef extending $1\frac{1}{2}$ cables off its eastern end, will be seen in mid-channel, with a deep water channel half a mile wide on either side of it. Between Bench Island and Fancy Group there is a clear channel one mile wide, with from 20 to 24 fathoms water.

A reef awash extends north-west from Anglem Point nearly one-third of a mile, with tide rippings off it; there is 9 to 13 fathoms in the entrance between it and Native Island; on the southern side some rocks, awash or marked by kelp, extend nearly a quarter of a mile off the northern coast of the peninsula.

Cooper Island lies one mile inside the narrowest part of the entrance; it is two miles long east and west, and half a mile wide; two small islets lie off its south-west end, with two detached rocks awash at low water, a short distance westward of them; also shoal patches a cable off its north-west end marked by kelp.

Sydney Cove, a sandy bight on the north side of Cooper Island, affords anchorage in nine fathoms for vessels making a short stay, but not desirable in easterly weather.

Glory Cove—(see plan)—the most snug and convenient anchorage in Paterson Inlet, on the south-west side of the peninsula, is two miles southward of the east end of Cooper Island; its entrance is four cables wide, the depth within four to six fathoms, good holding ground. This is an excellent place for a ship requiring refit or repairs; at a point on the western side vessels may be hove down with facility, there being 18 feet at low water close to the beach. Vessels may pass between the east end of Cooper Island and the peninsula, avoiding a shoal marked by kelp, off the peninsula side; this passage is a quarter of a mile wide, with 16 to 20 fathoms water.

South-west Bay, south-westward of Glory Cove, runs in a south-westerly direction three miles, with a width of one mile; the depth is 12 to 14 fathoms, but anchorage may be had in six fathoms near the head; five islands lie off its western point, narrowing the entrance to half a mile.

For two miles above Cooper Island, the inlet is nearly three miles wide, and with 12 to 16 fathoms water; several islets and rocky patches extend nearly a quarter of a mile off shore, marked by kelp.

Kaipipi Bay on the north side, four miles above Native Island, is a third of a mile wide, with anchorage in five fathoms. Half a mile within it shoals to four fathoms, and shortly afterwards to 10 feet.

Westward of Kaipipi Bay the inlet narrows to one mile, with 12 and 10 fathoms water; two miles above is an extensive bay on the north shore, which at low water dries within the line of its entrance points; the main arm runs south-west for $2\frac{1}{2}$ miles farther, with a width of half a mile, and from 10 to 6 fathoms, terminating in a shoal creek, which dries a mile and a

half from its head, leaving a narrow boat channel of two to three feet at low water.

Port Adventure (see plan) is 10 miles southward of Paterson Inlet, the coast between is a succession of bold rocky headlands, with occasional sandy beaches, without shelter.

East Head, a projecting headland, the eastern point of Stewart Island, is $2\frac{1}{2}$ miles northward of Port Adventure. Two miles off the coast the soundings range from 20 to 25 fathoms sand, shoaling gradually.

The port is small, and open to the eastward, but affords good shelter in all westerly winds; Entrance Island renders the passage narrow for large vessels to work through. Stirling Head, the northern entrance point, is steep and cliffy, with a small islet (*Weka*) close off it; the southern entrance point, Shelter Point—formed by a peninsula—has a detached rock awash, nearly a quarter of a mile off it.

The best passage between Stirling Head and Entrance Island is scarcely four cables wide, with 14 to 20 fathoms, except a patch of 18 feet W. by S. $\frac{1}{2}$ S. two cables from the north point of the island. The passage southward of Entrance Island is the same width, but has a rock in its centre, with 20 feet, marked by kelp, with deep water on either side. Inside the heads there is a working width of three-quarters of a mile, with 9 to 13 fathoms; on the south side, a quarter of a mile off shore, are several rocky patches, with nine feet on them, marked by kelp, with deep water between them. $1\frac{1}{2}$ miles within the entrance the harbour terminates in three coves, in the southernmost of which, Oyster Cove, small vessels might lie in safety with all winds.

Weka and Wreck Reefs, off the entrance of Port Adventure, are the principal dangers on this part of the coast. Weka, the northernmost, is a quarter of a mile in extent, detached, and covered, always breaks; it bears from Weka Islet N.E. by E. $\frac{3}{4}$ E. $1\frac{1}{4}$ miles, from north end of Entrance Island N.E. $\frac{1}{2}$ N. nearly $1\frac{1}{2}$ miles. Wreck Reef is also detached, with a rock just above water; in bad weather it breaks very heavily; it is E. by S. 2 miles from the east end of Entrance Island, and N.E. $\frac{1}{2}$ N. 3 miles from the outer Breaksea Islet; there are 29 to 33 fathoms from one to $1\frac{1}{2}$ miles outside them, and 10 fathoms within half a mile of the south end of Wreck Reef.

From Shelter Point the coast turns sharply S.W. by W., with a rugged outline; a group of craggy islands extends a mile and a half southward from the point, the sea constantly breaking over them with great violence. From their proximity to Port Adventure, and forming a barrier to the enormous swell which rolls along the south side of the island, they were named the Breaksea Islands.

Bruce Reef.—This serious danger, off the south-east extreme of Stewart Island, is described as two low rocks, three to six feet high, close together, on which the sea breaks heavily, and lies in the direct track of vessels closely rounding Stewart Island proceeding to or from the southern parts of New Zealand. Its position is as follows:—

7 1-10th miles	...	E. by N. $\frac{3}{4}$ N.	...	from Owen Island off Lords River
5 1-10th	„	E. by N. $\frac{1}{4}$ N.	...	„ the extreme of the Breaksea Isles
$3\frac{1}{4}$	„	E. by S. $\frac{3}{4}$ S.	...	„ Wreck Reef off Port Adventure
$7\frac{1}{4}$	„	S.E. $\frac{3}{4}$ E.	...	„ East Head, north of Port Adventure

Soundings have not been obtained in its neighbourhood. The mariner is therefore warned to keep a vigilant look out.

Lords River, $3\frac{1}{2}$ miles south-westward of Shelter Point, may be known by a cluster of rocky islands off its eastern head, the coast between which and the Breaksea Islands forms as a bight. This little harbour, a narrow arm of the sea, runs in a W. by N. direction, and is a snug anchorage for a steamer or a small sailing vessel. The entrance is only two cables wide. It is necessary to haul sharp round westward to secure a good berth, a quarter of a mile inside the western head in six fathoms, sand and gravel. Here a vessel may lie perfectly land-locked. Two cables above this anchorage are two shoal patches marked by kelp. Four fathoms water may be carried one mile above the heads. Boat navigation extends four miles.

Port Pegasus (see plan) may be recognised by three bare granite cones (Fraser Peaks), from 1,000 to 1,430 feet high, over the south arm, one

mile from the west side of Stewart Island. The main entrance is 17 miles S.W. by W. from Lord's River. The coast between has an irregular rocky outline, with numerous scattered rocks off it. White Rock, three-quarters of a mile off shore, is two miles westward of Lords River. Toctoes Bay, a small sandy cove with a boat harbour at its head, is six miles westward of that river, with a small islet off its eastern cliffy head. Black Rock, 20 feet high, about the size of a small vessel, is $1\frac{1}{2}$ miles off shore, and 10 miles from the main entrance of Port Pegasus. There are 35 to 37 fathoms, sand, from one to three miles off this coast.

The port is seven miles in extent north-east and south-west, parallel with the coast, which gives it a broken appearance, from the many passages in:—three islands in the entrance form the same number of ship channels. The main passage, a half mile wide in its narrowest part, lies between Pearl and Anchorage Islands—the north-east and centre islands—with 20 to 24 fathoms, and no dangers. The southern passage between Noble Island—the south-eastermost—and the mainland, in its narrowest part is not over two cables wide with 15 fathoms. The Northern or Whale Passage, little over a cable across, with a depth of five fathoms—lies between the northern shore and Pearl Island. Between Noble and Anchorage Islands there is only a boat passage.

Either of the three ship channels may be taken according to circumstances, though Broad Passage alone is recommended for a vessel of large size to work through. It trends N.W. by N., the South and Whale passage W.N.W.

The port is divided into the north and south arms, connected by a narrow strait—Acheron Anchorage. Main and Whales Passages lead direct to the north arm, and South Passage to the south. In the north arm the depth is inconvenient for anchoring, being from 20 to 25 fathoms, but 12 fathoms may be had just westward of a small island at the north head of the arm, two miles from the entrance. In the south arm anchorage may be had in 12 to 14 fathoms half a mile within South Passage, between Micrometer Rock and Noble Island. There are several coves within which vessels may anchor in 8 to 10 fathoms. Shipbuilders Cove, on the north shore, has some rocks and shoal patches, marked by kelp. Micrometer Rock is a small rock above water in the centre of this arm, with a reef extending nearly a cable northward of it. There are also several small islets scattered about, but no dangers not marked with kelp.

Acheron Anchorage, a narrow strait two cables wide and $1\frac{1}{2}$ miles long, connecting the north and south arms, is formed by the main land and by Noble and Anchorage Islands; it affords the most convenient and sheltered anchorage in the port, in 9 and 11 fathoms, mud; three small islets, in the eastern entrance (Steamer Pass) narrow in so much as to render it only fit for a steamer or small sailing vessel from that direction; this entrance is south of the islets, with a depth of 10 to 15 fathoms. This anchorage therefore is not generally available for ships entering by Broad Passage, but those entering by south passage with a leading wind, intending to make any stay, should take advantage of it: the western entrance is clear, and two cables across, where ships may anchor in the broad part, in 11 fathoms, well sheltered.

Seal Creek, a deep narrow inlet, penetrates in a northerly and then in a westerly direction from the westerly entrance of Acheron's Anchorage.

WATER.—Port Pegasus abounds in excellent timber for shipbuilding. Fresh water can be obtained from the streams in any of the coves.

Wilson Bay trends north and south, four miles south-westward from Port Pegasus and two miles north-east of South Cape; its shores are skirted with rocks, and exposed, with a depth of 14 to 20 fathoms.

The southern end of Stewart Island terminates in a block of land four miles wide, the extreme of which, the south-west cape, three miles westward of South Cape, has sunken rocks half a mile off it; the coast is high and bold, with a steep and rugged shore.

The Traps, two dangerous reefs, lie south-eastward of the south end of Stewart Island. The north Trap Reef covers a space of $2\frac{1}{2}$ miles, with two rocks near either extremity, three to four feet high, resembling a boat

bottom up: the centre of the reef bears from South Cape, E. by S. $15\frac{1}{2}$ miles, and is 11 miles from the nearest land (between Wilson Bay and Port Pegasus), the depth between being 60 fathoms; two miles westward of this reef there is 23 fathoms.

The south Trap Reef is nearly two miles in extent, with portions from four to six feet above high water, and heavy breakers about it; its centre bears from South Cape S.E. by E., 20 miles. These two reefs bear from each other N. $\frac{1}{2}$ W. and S. $\frac{1}{2}$ E., about nine miles, with 48 fathoms water between.* Captain Fairchild says:—"They are more dangerous than is generally supposed. In bad weather breakers have been seen eastward of that shewn in chart. Vessels should give them a wide berth, as the tides are strong, and the soundings not reliable."

South West Coast.—The south-western side of Stewart Island is fronted by a group of rocky islands; the most outlying, Wedge Island, one mile long, is six miles from the land; they are all similar in feature, their western faces, steep cliffs, from 300 to 400 feet high, sloping to their east, where boat harbours are generally found.

In the passages among these islands the tides run with great velocity, rendering them hazardous to attempt. The northernmost, Moggy Isle, lies five miles N.N.E. from Wedge Island.

Port Easy, a confined anchorage in five fathoms, occasionally frequented by sealers, lies nine miles northward of South-west Cape; its entrance, north and south, is about a quarter of a mile wide. Two small islets, The Brothers, lie two miles westward of it, and the same distance north a rocky cluster of four islands (Boat Group), extend from the coast three miles south-west and serve in some manner to break the sea.

Between Port Easy and Mason Bay, 15 miles, there is no shelter; the coast is irregular, with high rugged cliffs, on which a heavy westerly sea or swell constantly breaks. A deep bight runs in three miles southward of Mason Bay, where boats may obtain shelter by hauling up inside the rocky ledges at its head.

Mason Bay, a peculiar low sandy feature on this wild west coast, has a sandy beach five miles long, with wooded flats at the base of the mountain ranges. There is anchorage in its southern part in three to four fathoms, protected from west and north-west winds by the Ernest Isles, two jutting red cliffy faced islands close together, with a boat passage between; the South Island is connected at low water with the main by a sandy neck. A heavy sea rolls into the bay from the northward, but small vessels can lay here well sheltered; in case of emergency a large vessel, by getting close to the Ernest Isles, will be in a secure anchorage.

Guide Rock, above water, lies half a mile W. by S. from the north end of North Ernest Island, and also a rock nearly awash two cables westward of its south-west end. Look-out-for Reef, a dangerous patch, over half a mile in extent, nearly awash, lies N.N.W. $2\frac{1}{2}$ miles from the north end of the same island, with a clear deep channel between. On the same bearing, a little over three miles from this reef, is a shoal, which only breaks occasionally, with 25 fathoms between.

Codfish Island lies nine miles N.N.W. of Ernest Island and $4\frac{1}{2}$ miles S.S.W. from the Rugged Isles (off the north-west extreme of Stewart Island). It is three miles long north-west and south-east, and two miles across, moderately high, level-topped, with a small stony eminence near its centre; between it and Stewart Island is a passage nearly two miles wide, with seven and eight fathoms; High Rock lies in its centre.

Sealers Bay is a confined anchorage on its north-east side, well sheltered from westerly winds, in six to eight fathoms.

The western side is high rugged cliff rocks and foul ground extends one mile off it; two miles off there is 30 to 36 fathoms, sand and gravel.

On the coast of Stewart Island, fronting Sealers Bay is a remarkable

* The ordinary north-east sea breezes of the east coast appear to be lost about the South Trap Reef, being met by the N.N.W. wind of the west coast; for this reason vessels bound either way should give the Traps a wide berth.—Commander B. Drury, H.M.S. Pandora. A shoal called the Boomerang Breaker is reported (1862) as lying about N.W. by N., $3\frac{1}{2}$ miles from the South Trap.

castellated peak. The coast southward of this peak to the north end of Mason's Bay, eight miles, is thickly strewed with rocks, extending one mile off shore, on which there is always a heavy swell, and occasionally blind breakers on the foul ground one league off. This treacherous space has been the cause of much loss of life to the early sealers in passing it in their boats.

Rugged Isles extend from the north-west point of Stewart Island, a remarkable cluster of high black craggy rocks. Boats seldom venture inside; heavy tide rippings extend some distance seaward; there is 24 to 30 fathoms from half to one mile off them; sailing vessels should not approach within a league of this part of the coast.

Cave Point is E.N.E. $3\frac{1}{2}$ miles from Rugged Islands.

The **White Rocks**, a detached cluster 20 feet high, with a sunken rock outside them to the N.W., lie $1\frac{1}{2}$ miles N.N.E. from Cave Point. One league eastward of them is Black Rock Point, the north extreme of Stewart Island, just westward of which is a remarkable white sand patch; thence the coast trends E. by S. 5 miles to Saddle Point. This portion of the coast has a rugged rocky outline with occasional shingle beaches; Mount Anglem and the lofty ridge westward of it send down their steep spurs to the shore.

TIDES.—The flood tide coming from the southward strikes the south end of Stewart Island and divides, one part running northward along its western side, then eastward and south-eastward through Foveaux Strait; the other runs north-east along the south-east end of the island, as far as Port Adventure, where they meet again and flow eastward. The ebb takes a contrary direction, splitting near Port Adventure, running north-west, through the strait, and down the west side of the island, and south-west along the south-east side as far as south-west cape.

It is H. W. F. & C. at Ports Pegasus and Adventure at 11h. 50m. and 0h. 20m. respectively; at Port William and Paterson Inlet at 0h. 45m. and 1h. 10m.; and Masons Bay at 11h. 10m.: springs rise 8, neaps 6 feet. The tides off the coast run from $\frac{1}{2}$ to $1\frac{1}{2}$ knots, inside the group off Port William and Paterson Inlet from one to three knots, and in the passage between south-west cape and Long Island, four knots during springs.

THE SNARES (see Sheet Chart XI.)

Are bold and moderately high, destitute of vegetation, and covered by Cape pigeons; they lie 62 miles S.S.W. of the south-west end of Stewart Island, and extend $4\frac{1}{2}$ miles in a N.E. by E. and S.W. by W. direction; they are an excellent landmark (which is not what their name implies) from the westward, and recommended as a point of departure in passing south of Stewart Island.

The north-east or largest island, over one mile long and half a mile wide, rises on the south side perpendicularly to the height of 470 feet; the north-east side is less precipitous. Captain Fairchild says, "On the north side is a small safe harbour, where vessels of 50 tons could be hauled in with lines, and made fast to the trees, and would lay afloat at all times of tide, in perfect safety. Firewood can be obtained here. There are no outlying dangers. 49 fathoms was found within four cables all round; the western group can only be landed on in very fine weather."

The western portion consists of four islets, two miles south-westward of the large island. A reef, which breaks, lies in the channel between, which it narrows to about $1\frac{1}{4}$ miles.

79 fathoms, coral, was found two miles north and south-east of the large island, deepening seaward in every direction, except in a line towards the Trap Rocks, where it gradually decreases to 40 fathoms one mile from the south reef of the latter. The tides about the group are inconsiderable.

WEST COAST OF THE SOUTH ISLAND, FROM THE WESTERN ENTRANCE OF FOVEAUX STRAIT TO CAPE FAREWELL.

VARIATION IN 1875.

Preservation Inlet	-	16° 20' E.	|	Arnett Point	-	15° 55' E,
				Cape Foulwind	-	15° 20' E.

The remarkable sounds or inlets which penetrate the south-western shores of South Island lie between the parallels of 44° and 46° south latitude.

The precipitous and iron-bound coast line runs in a N.N.E. and S.S.W. direction; and the whole of these sounds, thirteen in number, are included within a space of little over one hundred miles. Their character and features so much resemble each other that it is desirable to describe them generally before entering into a detailed account.

Approaching from seaward there is so much sameness in the appearance of the land that unless a vessel knows her position accurately, it is not easy at a distance to distinguish the entrance of one sound from another; the smaller inlets at a distance of 4 or 5 miles have more the appearance of ravines between the high and rugged mountains than of entrances to harbours; in moderately clear weather the coast can be made with confidence, and as the entrances are generally equidistant (about eight miles), and all running in an easterly direction, there would be but little danger to be apprehended from a lee shore; but a fresh or even a strong westerly wind in the offing frequently dies away within a mile of the coast, leaving a vessel at the mercy of a calm and swell; moreover, there is always an outset, particularly from the smaller sounds, and frequently a draught of wind down their narrow arms, so that unless with a fresh fair gale, which blows right home and up the sounds, sailing vessels will generally find it a difficult and tedious operation to fetch inside their entrances.

The larger ones are in some measure exempt from these inconveniences; they generally divide into several arms, penetrating in some instances a distance of 20 miles, with a breadth rarely exceeding one mile, and studded with numerous islets. The smaller sounds generally run in six or eight miles, with a width of about half a mile, and anchorage is seldom to be found except at their inner extremes.

The shores rise almost perpendicularly from the water's edge in the immediate neighbourhood of the sounds, covered with trees suitable for all purposes; among them the red pine, which, although heavier and inferior to the kauri, is well adapted for masts, and a vessel requiring spars could procure them of any size, up to a sloop of war's lower mast, with little difficulty; for this purpose the southern inlets are preferable.

Soundings can rarely be obtained under 80 or 100 fathoms, and frequently at much greater depths; and the shores, within a few yards, are quite steep. Vessels may frequently warp up by laying out lines to the shore: and when a cove is reached where an anchor may be dropped, it will generally be necessary to secure to the trees also, to prevent being drifted off the steep bank. The flaws or squalls frequently blow with great violence off the high land, or down the gullies, during heavy gales outside.

Across the entrance of several a narrow belt of soundings from 30 to 50 fathoms will be found, where, under favourable circumstances, a vessel may drop a kedge, and thus prevent being carried out by the ebb; the flood is but little felt.

At daylight is the best time for leaving these anchorages, when a land wind prevails for a few hours; indeed, unless the wind is blowing directly in, a vessel will seldom have any difficulty in getting to sea. Near the coast a constant current of nearly one mile an hour sets to the south-west.

The prevailing winds on this coast are from north-west to south-west, the former frequently bring rain and thick weather, and as the shore is approached veer northward; south-west winds are fine and clear; rain is of very frequent occurrence, and often lasts for several days.

Excellent fish of several kinds are abundant; crayfish abound in the southern ports, also several species of ducks, pigeons, &c. The sandflies are of a most virulent kind; among the thick foliage a short distance from the beach they do not penetrate, and invariably leave vessels at dusk, not to re-appear till the following daylight.

"A view of the surrounding country, from the summit of one of the mountains bordering the coast of from 4,000 to 5,000 feet elevation, is perhaps one of the most grand and magnificent spectacles it is possible to imagine; and standing on such an elevation rising over the south side of Caswell Sound, Cook's description of this region was forcibly recalled to mind. He says, 'a prospect more rude and craggy is rarely to be met with, for inland appeared nothing but the summits of mountains of a stupendous height, and

consisting of rocks that are totally barren and naked except where they are covered with snow.' We could only compare the scene around us as far as the eye could reach, north to Milford-haven, south to Dusky Bay, and eastward inland for a distance of 60 miles, to a vast sea of mountains, of every possible variety of shape and ruggedness, the clouds and mist floated far beneath us, and the harbour appeared no more than an insignificant stream; the prospect was most bewildering, and even to a practised eye the possibility of recognising any particular mountain, as a point in the survey from a future station, seemed almost hopeless."—Commander (now Admiral) Richards, H.M.S. Acheron.

Preservation Inlet, the southern of this series of remarkable sounds, is at the south-west extreme of South Island, 80 miles from Port William, Stewart Island, and the same distance from Bluff Harbour. Its entrance lies between Puysegur Point and Gulches Head, which are $4\frac{1}{2}$ miles distant N.N.W. and S.S.E. The southern point, Puysegur, is a low sloping projection.

LIGHT.—A *flashing white* light, shewing a flash every 10 seconds, 180 feet above the sea, is shewn from a white tower 40 feet high, on Puysegur Point, at the S.W. extremity of South Island, visible all round seaward for 19 miles.

Gulches Head (the dividing point also between Preservation and Chalky Inlets) is rugged and cliffy, with rocks above water two cables off, and a sunken rock, detached and breaking, one-third of a mile south of it. Coal Island, 850 feet high, $2\frac{1}{2}$ miles long north and south, and $1\frac{1}{2}$ miles wide, lies between these points, dividing the entrance, the north or main entrance being $1\frac{1}{2}$ miles wide; the southern, merely a boat channel or refuge for small vessels, is called Otago Retreat.

Balleny Reef lies off the main entrance (its nearest point S.S.W., three-quarters of a mile from Gulches Head), partly awash, is $1\frac{1}{4}$ miles in extent south-west and north-east, and breaks heavily; there is a ship channel between it and Gulches Head, nearly half a mile wide—Broke-adrift Passage—with 7 to 12 fathoms, irregular rocky bottom; unless with a fair wind, vessels are not recommended to take it, and must then be careful to pass outside the sunken rock, one-third of a mile south of Gulches Head.

Table Rock, a flat rock 20 feet high, lies W.S.W. $2\frac{1}{4}$ miles from Gulches Head, and N.W. by W. $\frac{1}{4}$ W. one mile from the outer rock of Balleny Reef, with deep water close-to, and a passage between it and the reef.

Approaching from southward or eastward, Preservation Inlet will be readily known, being the first opening seen. From westward, the high white cliffs of Chalky Island, at the entrance of the inlet of that name, and two miles westward of Gulches Head, are an excellent guide; also Treble Mount, 3,380 feet high, making from westward, with two peaked summits, which rises from the centre of the peninsula separating Preservation from Chalky Inlet, is visible a long distance seaward, and bears from the main entrance N.N.E. 7 miles.

Entering Preservation Inlet with a north-west wind it always draws to N.N.W. or even more northerly, so that with the current, which sets out and southward with considerable strength, a dull sailing vessel will rarely fetch in through the entrance, which lies north-east and south-west. The Balleny Reef should therefore be hugged within less than half a mile—its edge is well defined—and Gulches Head be kept pretty close on board (avoiding the sunken rock off it); if Coal Island cannot be weathered, a vessel should not stand far over towards it—where the outset is very strong—but keep to the north shore until as high up as Price's Beach, the first sandy beach one mile above Gulches Head; off which, in Welcome Road, a vessel may anchor in north-west winds, in eight fathoms, three cables from the beach; but with south-east winds there is always a swell in the outer part of the inlet, until round Cavern Head, three miles E.N.E. from Gulches Head.

SUNKEN REEF.—Between Gulches and Cavern Heads a bay runs northward $1\frac{1}{4}$ miles; two cables within the line of these heads lies a dangerous reef which does not always break; it bears from the outer end of Price's Beach E.N.E. one and four tenths miles, from Cavern Head W. by S. $\frac{1}{2}$ S. one mile, and from Spit Islet, a high rugged craggy rock connected with the north shore by a sand spit, S. by W. $\frac{1}{2}$ W. half a mile; it has 17 fathoms

close-to : entering with a leading wind do not stand inside the line between Gulches and Cavern Heads ; working in the passage is three-quarters of a mile wide between Pinnacle Rock, at the north point of Coal Island, and the reef, which bears from it N. W. $\frac{1}{2}$ N. ; when Spit Island bears north a vessel will be inside it ; the depth in the outer part of the inlet is 20 to 16 fathoms until between Cavern Head and Coal Island, when it increases to forty-five fathoms.

Cavern Head is a rugged and broken point, on which the swell always breaks, its summit is saddle-shaped ; several rocks above and below water lie westward of it, and a sunken rock $1\frac{1}{2}$ cables W.S.W. from the extreme ; this headland should not be rounded very close, in working a vessel should not stand so far northward as to shut in the southernmost Cording Islet with it.

Cuttle Cove, the first sheltered anchorage, lies one mile northward of Cavern Head ; after rounding this head the passage is between the western horn and Cording Islets, in the narrowest part scarcely four cables wide ; the cove is the third bight above Cavern Head, with a small islet (Single Tree Islet) off it ; the anchorage is between this islet and the mainland in 10 to 15 fathoms mud, snug and well sheltered.

Cording Islets, a chain of four islets and some smaller rocks, lie north-eastward of Cavern Head ; with channels between them through which vessels may pass if necessary, in working up for Cuttle Cove ; when pass northward of the largest islet, one cable from its northern point, as a sunken rock lies two cables north of that point ; with north-west winds it is recommended to work up westward of the islets. In standing eastward, between the South Cording Islet and Steep-to Island, the Whale Rock must be avoided ; it is awash, with deep water all round, and bears north a quarter of a mile from the north end of Steep-to Island.

Round Islet and Wood Hen Island, eastward of Cording Islets, have no dangers but what are visible, and may be approached close.

Steep-to or Crayfish Island is a quarter of a mile northward of the north-east end of Coal Island, and connected with it by a reef with only three feet at low water ; a rocky head projecting from its western side affords shelter for small vessels unable to work up for Cuttle Cove ; anchor as close as possible under the rocky head, about a cable from the shore, in 10 to 6 fathoms. The reef which connects the two islands is only two cables south of the head ; the water shoals suddenly from 33 fathoms to 10 ; this small anchorage does not afford shelter for more than one vessel.

Isthmus Sound.—The westernmost arm, above Cording Islets, runs in a northerly direction three miles, with a width of half a mile ; and 45 to 25 fathoms water within a quarter of a mile of its head ; in its central part no bottom was found with 56 fathoms.

Useless Bay runs parallel with Isthmus Sound, one mile eastward, separated from it by a narrow tongue of land. Colt Head, its southern extreme, is E.N.E. $2\frac{3}{4}$ miles from Cavern Head.

Revolver Bay is immediately opposite Useless Bay, runs in a southerly direction one mile, with a breadth of one-third, and anchorage in 12 fathoms a quarter of a mile from its head.

Long Sound extends 14 miles above Colt Head. Having passed which, steer through Narrow Bend, which runs north-eastward two miles, to Sandy Point, on the eastern shore, round which, in Harries Bay, there is anchorage in 15 fathoms, $1\frac{1}{2}$ cables from the beach. From Harries Bay the sound opens out to one mile wide, and trends north-westward for $2\frac{1}{2}$ miles ; thence again north-eastward, with the same width, to Only Isles, on the eastern shore. Above these it narrows to half a mile, and terminates three miles above in Cascade Basin, with a very narrow entrance, in which there is 8 to 10 fathoms. There is a waterfall at the head of the basin.

The soundings in Long Sound, unless close to its shore, are very deep. There is 24 fathoms inside Only Isles, On the western shore, three-quarters of a mile, above Trevacon Head—a high cliffy projection, two miles above the north-west bend—is a small cove, which runs westward a quarter of a

mile, and nearly a cable wide, with a depth of four fathoms. A vessel might haul into it and secure herself.

South Entrance of Preservation Inlet, between the south end of Coal Island and Puysegur Point, may be used with advantage by small vessels not able to work in on account of the current or from other causes. The entrance is narrow; between a sunken reef lying in the centre and the point of Coal Island it is not more than two cables wide. To take this channel, hug the point of Coal Island as close as possible—within a ship's length. If not able to lay through, drop anchor as soon as under the lee of it, in eight or nine fathoms, and immediately send a hawser to the rocks on the island shore. If blowing too hard to warp further up, the end of a chain should be carried on shore and secured to the rocks, when she will lie in perfect safety. In a moderate gale a vessel may warp up by the island shore for half a mile, when good anchorage in four fathoms will be found, in perfectly smooth water. A mile within the entrance a bar of sand extends across, with only six feet at low water. A vessel over that draught must wait for the tide to proceed higher up.

When anchored in one of the snug coves of Preservation Inlet, very little idea can be formed of the weather outside; a boat should always be sent to Cavern Head to observe it before putting to sea.

The ebb tide runs out at about one knot. The flood tide is but little felt; it runs eastward between Gulches Head and Balleny Reef, and sets across the entrance south-east.

SUPPLIES.—A stream of fresh water runs into Cuttle Cove; wood may be cut in any quantity. Pine spars may also be procured with much facility. Fish are abundant, and at the south entrance may be taken with hook and line in almost incredible quantities. Crayfish abound in most of the coves.

Chalky or Dark Cloud Inlet (see Plan, Sheet XI.) lies immediately north-west of Preservation Inlet. Its entrance is marked by the white cliffs of Chalky Island, which lies in its centre, also by Mount Treble on its eastern side. Cape Providence, its western entrance point, 300 feet high, lies five miles S.S.E. of West Cape, surrounded by reefs and sunken rocks, which extend from it one mile southward.

The main arm runs N. by E. $8\frac{1}{2}$ miles from the south-east point of Chalky Island, with a breadth of nearly $1\frac{1}{2}$ miles, when it divides; Edwardson's Sound continuing the northerly trend six miles further, and Cunaris Sound taking an E.N.E. direction, almost the same distance.

The principal anchorages are South Port and North Port, the former on the eastern side, four miles above Gulches Head—the latter on the western, six miles from the S.E. end of Chalky Island. Chalky Island and the Passage Islands, immediately northward, lie in the middle of the entrance, with a wide ship channel on either side.

The **EASTERN PASSAGE**, between Gulches Head and Chalky Island, is most convenient for vessels from the southward; Balleny Reef and Table Rock lie across the entrance; vessels may enter either between Gulches Head and Balleny Reef, or between Chalky Island and Table Rock, which lies S. $\frac{1}{2}$ W., nearly two miles from the south-east end of Chalky Island; this passage is by far the best; it has 20 to 25 fathoms water, and is free from dangers; when inside the point of Chalky Island, the width of the channel is $1\frac{1}{2}$ miles, the depth from 60 to 70 fathoms; the Pinnacle Rock and several scattered rocks under water extend a quarter of a mile off the N.W. end of the island. The passage between Chalky and Passage Islands is by no means recommended.

The **WESTERN PASSAGE**, between Cape Providence and Chalky Island, is best for vessels from the north-west; with a wind not northward of north-west they would lay through and fetch South Port.

In taking this passage, the reefs awash and sunken off Cape Providence are to be avoided; the former extend south three-quarters of a mile; the latter S.W. $\frac{1}{2}$ S., one mile from Sugar-loaf Rock at the Cape Extreme; the cape should be given a berth of $1\frac{1}{2}$ miles until it bears north, when haul up N.E. between the western shore and the islands for three miles, when Return Channel will open out, between the north end of Passage Islands

and the south end of Great Islands—which forms North Port, and is more than half a mile in width—with a depth of 22 fathoms; the south-east point of Great Island should not be approached under a quarter of a mile to avoid Sunk Rock. From the north end of Passage Islands, South Port bears east, two miles.

Sunk Rock, a pinnacle rock with five feet on it at low water, and five to nine fathoms close round, lies one cable southward of Seal Rock at the south point of Great Island.

Landing Bay is immediately within Cape Providence; temporary anchorage may be had at its entrance, in nine fathoms, if necessary, but it shoals suddenly within. Two miles above this bay, is Breaker Point—the western point of the blind entrance to North Port—off which breakers extend half a mile; vessels should not stand up Blind Entrance, as there are only a few feet water a short distance within.

South Port (see plan), on the eastern shore of the inlet runs nearly two miles S.E. by S., with a breadth, when inside, of nearly half a mile; the entrance four miles above Gulches Head, is rendered very narrow by islets and rocks; the narrowest part is less than a cable in width, so that vessels can only enter with a leading wind, or tow in during a calm.

From the western entrance point, two islets (Garden Isles) extend in a northerly direction four cables, which must be passed to the northward, as there is only a boat channel between them and the south shore; a rock awash lies in the centre of the entrance a long quarter of a mile N.E. by E. from the north point of outer Garden Island; from the north-east point of inner Garden Island shoal water extends eastward $1\frac{1}{2}$ cables, with only six feet water at its outer extreme, marked by kelp; and from Reef Point, the eastern entrance point, a reef extends towards this six feet patch; here is the narrowest part of the channel, when through it about a cable the port opens out to a width of half a mile.

Vessels may lay securely in Anchorage Cove, on the port hand, immediately within Reef Point, in from 14 to 9 fathoms, $1\frac{1}{2}$ cables from the beach; wood and water may be obtained with facility; above Anchorage Cove the port narrows to little over three cables, and the water deepens from 15 fathoms to 30 and 36 fathoms.

Vessels intending to anchor in South Port, should pass northward of Garden Islands, and of the rock awash at a convenient distance; then keep the eastern shore on board within a cable; on nearing Reef Point, look out for the six feet patch, which bears W. $\frac{1}{2}$ N. from it; if not seen keep within a cable of Reef Point until past that bearing; in hauling into Anchorage Bay observe that shoal water extends more than a cable southward of it.

Entering by the western entrance for South Port when Return Channel is open, Stripe Head with its jib-shaped patch, on the eastern shore will be seen, when steer midway between it and Garden Islands, and as before directed.

North Port (see plan), on the western side of Chalky Inlet, 5 miles above Cape Providence, lies between Great Island and the main land, which are connected by a bank with only one fathom water from about the centre of the island; the south entrance to this port becomes in consequence a blind one.

LITTLE ISLAND lies across the north entrance to North Port. Ship Entrance is between its south point and the north end of Great Island; the channel is narrow, little over half a cable wide, with six and seven fathoms; the shores on both sides being steep-to; when a cable within the entrance the port opens out to a width of three cables; the anchorage is in the centre, two cables from Little Island in 14 fathoms, mud, perfectly land-locked; the port runs westward three-quarters of a mile, with 15 and 18 fathoms water, when it shoals suddenly to two and one fathoms on the bank which connects Great Island with the main. Between Little Island and the north shore is a boat channel.

North Port is easy of access with a leading wind, but the entrance lies in a westerly direction, opposed to prevailing winds, and therefore not so convenient for sailing vessels as South Port; for a steamer it is certainly preferable.

EDWARDSON SOUND, the northern portion of Chalky Inlet, is bounded

by steep and rugged ranges, 3,000 to 4,000 feet high; the depth in its central parts exceeds 100 fathoms; the shores are steep and free from dangers to the head, which terminates in Lake Cove, with moderate depth for anchoring.

CUNARIS SOUND, the north-east arm of Chalky Inlet, has equally deep water; its head terminates in two coves, with 15 to 24 fathoms.

Small craft harbour islets on the south shore at the entrance; in a small cove on their southern side, small vessels may anchor in eight fathoms; there is 25 to 15 fathoms on the south shore in a shingle bay.

West Cape.—From Cape Providence to South Point, the south entrance head of Dusky Sound, is 13 miles N. by W. $\frac{1}{2}$ W. West Cape lies midway between, and projects about half a mile from the general trend. There are no dangers any distance off this coast, vessels may approach it within one mile. At two miles from the shore there is 40 or 50 fathoms.

Dusky Sound lies between Five Fingers Point and South Point, four miles apart. Approaching from southward, Chalky Island is a good guide to the entrance, also West Cape.

From northward Five Fingers Point cannot fail to be recognised. It is the south-west extreme of Resolution Island, which separates Dusky from Breaksea Sound. Several high-pointed rocks off its extreme, when viewed from certain situations, give it the appearance of the fingers of a man's hand. The land about the point is the extreme of a narrow peninsula, lying N.N.E. and S.S.W. for seven miles, of moderate and equal height, covered with wood.

Dusky Sound runs E.N.E. 22 miles, studded with numerous islands and rocks, but few dangers that are not visible.

Anchor Island, $3\frac{1}{2}$ miles long in the direction of the sound, 1,360 feet high, lies immediately within the entrance, surrounded by a labyrinth of small islets. A small harbour (see plan on sheet chart) on its north side, about the centre, affords secure anchorage, sheltered from northward by the Petrel Islands, immediately off its entrance. Vessels entering the sound northward of Anchor Island with a strong north wind, and unable to work up for Facile Harbour, might find it convenient; otherwise it is not recommended, on account of the difficulty of leaving with the prevailing winds. The passage is on either side of Petrel Islands.

Southern Passage.—A vessel may pass on either side Entry Island, a small island a quarter of a mile south-east of the large Petrel. If northward, the south-west end of large Petrel should be kept close on board, to avoid a sunken rock with 13 feet on it at low water, which lies S. by W. one cable from that point; if southward of Entry Island, it must be passed close, to enable a vessel with a northerly wind to weather a rock above water that lies nearly in the middle of the harbour entrance. This rock may be passed on its south side, if necessary; having passed it, steer south-easterly for the entrance of the harbour, a quarter of a mile distant, and anchor in 16 fathoms, a cable from the shore: the width of the harbour is about one cable. The passage in, northward of Petrel Islands, is the widest, and with a north wind the best; these islands are bold-to.

South-westerly winds roll a heavy sea into the entrance of Dusky Sound, but smooth water is found a short distance within.

The principal anchorages in Dusky Sound (see plans on sheet chart) are, Pickersgill Harbour and Cascade Cove on the south side, Facile Harbour and Duck Cove on the north.

DIRECTIONS.—Entering from southward with a leading wind pass about half a mile from the south entrance point, and keep that shore on board at about the same distance, passing southward of all the islets off Anchor Island. 20 to 30 fathoms will be found at the entrance, and until abreast the outer end of the island, when no bottom is obtained at 80 fathoms. A reef above water, or awash, extends $\frac{1}{2}$ of a mile off the south shore, three miles within South Point, just above two small islets. The first indentation is Shelter Cove, three-quarters of a mile above this reef, only fit for boats.

Pickersgill Harbour is $5\frac{1}{2}$ miles above South Point, and abreast the west end of Indian Island, which is $1\frac{1}{2}$ miles long in the direction of the

Sound, and half a mile from the south shore. Crayfish Island lies across the entrance, with a narrow passage between it and the mainland; the best channel, a cable wide, is to the eastward, avoiding a half tide rock a short distance from the main shore, and S.S.E. from the east end of Crayfish Island; by keeping the island on board, this rock will be cleared, within there is anchorage in 15 fathoms, a cable from the shore. Wood and water may be procured here.

CASCADE COVE, three-quarters of a mile above Pickersgill harbour, has two small islands off its entrance; S.E. from their south end, midway between them and the shore, is a rock awash; the cove one-third of a mile wide at entrance, with 26 fathoms, runs $1\frac{1}{2}$ miles S.W. $\frac{1}{2}$ S.; good anchorage may be had in 12 to 15 fathoms for several vessels; the head terminates in a sandy beach, which dries some distance at low water; through it flows a considerable stream; the cascade is on the east side of the entrance.

Immediately above Indian Island are Long and Cooper Islands: these three islands form a chain extending nearly to the head of the sound, with a navigable channel both north and south of them. Long Island is seven miles long, and one wide, tapering at either extreme; its west end is almost connected with the east end of Indian Island by a chain of islets and rocks with no ship channel between; Cooper Island is $3\frac{1}{2}$ miles long, with a channel between it and Long Island $2\frac{1}{2}$ cables wide, and a depth of 36 fathoms.

To sail up the sound south of these islands, after passing Pickersgill Harbour, keep southward of the two small islands off Cascade Cove; above these islets the channel in some places is not over two cables wide, the depth ranging from 35 to 70 fathoms; towards the east end of Long Island the channel widens to nearly three-quarters of a mile, until half way along Cooper Island, abreast which is a cove on the southern shore, with a depth too great for anchorage. Above this cove the channel again narrows, and between the east end of Cooper Island and the south shore is not over 120 yards across (nine-fathom passage), with rocks extending from the island. This channel would generally be found tedious and difficult for a sailing vessel. Captain Garrard, s.s. *Albion*, reports a sunken rock about 30 yards from the mainland in the nine-fathom passage between Cooper's Island and the mainland.

Captain Fairchild says: "The Garrard Rock is 114 feet from the mainland, and has only one foot on it at low water. Vessels using this passage should be careful to keep in mid-channel between some rocks above water on the Cooper's Island side and the mainland. Four fathoms will be found in mid-channel."

The sound extends $3\frac{1}{2}$ miles above Cooper Island, with a breadth of half a mile, and terminates in two coves. In the northernmost anchorage may be had in 12 fathoms a cable from the sandy beach at its head, through which flow two large and rapid streams.

Facile Harbour,* on the north side of Dusky Sound, is a deep water anchorage, between Parrot and Pigeon Islands and the eastern shore, its entrance bears N.E. by N. $4\frac{1}{2}$ miles from Five Fingers Point; vessels bound southward undoubtedly would get easier to sea, with a northerly or north-west wind from it, than from the ports on the southern side.

Between Five Fingers Point and Anchor Island there is a clear working width of $1\frac{1}{4}$ miles without dangers, the depth 50 to 90 fathoms; vessels for Facile Harbour with a leading wind, after rounding Five Fingers Point, should keep the northern shore on board within half a mile until abreast Parrot Island four miles from the point; when the north end of this island is rounded the entrance of the harbour will bear east, $1\frac{1}{4}$ miles; it lies in the north-east bight of the bay, somewhat less than a cable in width, with a small islet on either side; there is safe anchorage within, in from 15 to 33 fathoms, and a snug cove in the north-east corner, where the remains of a large ship still exist. In leaving Facile Harbour, it will often be convenient with westerly winds to pass between Parrot and Pigeon Islands; the channel is scarcely a cable wide, with a depth of from five to nine fathoms in the

* See plan of Facile Harbour on Admiralty chart, Foveaux Strait to Awarua River, No. 2,589; scale, $m = 0.25$.

narrowest part; between Pigeon Island and the mainland there is only a boat channel. ("Capt. Fairchild reports a ledge of rocks with about nine feet on it, in centre of entrance to cove, on the N.E. side of Facile Harbour, which is dangerous, as the chart shows five fathoms right across the entrance.")

In the bight northward of Facile Harbour are Cormorant and Goose Coves, the former has an easterly trend, and is a snug anchorage with moderate depth. Goose Cove is a shallow tidal estuary.

Duck Cove, easy of access, and a convenient anchorage under any circumstances, lies on the north side of the sound, $3\frac{1}{2}$ miles N.E. $\frac{1}{4}$ N. from the north end of Indian Island, is a quarter of a mile wide at its entrance, and runs N. by W. three quarters of a mile, narrowing towards its head to a cable; mountains rise on either side to nearly 3,000 feet separated by a valley, at its head, through which a large stream runs into the cove. Anchorage in 11 fathoms, $1\frac{1}{2}$ cables from a boulder beach on the east shore, half a mile within the entrance. ("Captain Fairchild reports a sunken rock on the eastern side with about six feet on it at low water, one-third of a mile W. by N. from Porpoise Rock.")

Vessels for Duck Cove, entering Dusky Sound by the southern passage, should keep the south shore on board, as before directed, until reaching Indian Island, pass a convenient distance along its north side, and steer N.E. for the entrance where there is 30 fathoms decreasing to 15 and 10 at its head.

Entering from the northward, after passing Anchor Island, steer through the channel between its eastern end and the main; there are no dangers but what are visible. Leave Useless Islands on the port hand, pass mid-channel between them and the south-east point of Anchor Island, avoiding the Seal Rocks awash, which lie S.E. by E. one quarter of a mile from the latter point; when these are passed steer towards the east end of Indian Island, or S.E. by E. until the sound above opens out, when haul up north-east along the north shore, and as before. H.W. F. & C. 10h. 50m., spring rise 10 feet, neaps 6 feet.

Close off the outer east point of Duck Cove—a prominent point—is the Porpoise Rock, and E.S.E. from it, three-quarters of a mile, on the north coast of Long Island, is Detention Cove, a small nook, with temporary anchorage in 14 fathoms; from here the sound runs north-east, with depths of 120 and 160 fathoms; three miles above Porpoise Rock is the entrance of the arm which leads into Breaksea Sound; two small islets lie abreast it off the Long Island shore; within them is a rock awash; two miles above, in mid-channel, are Shag Isles, whence the sound continues clear along the north shore of Cooper Island to its head, with an average width of two-thirds of a mile, and very deep water.

Acheron Passage, connecting Dusky and Breaksea Sounds, runs N. by W. 8 miles, with width of half a mile, between Resolution Island and the mainland. High, precipitous, wooded mountains rise on either side to heights of 3,000 and 4,000 feet. In the middle of the channel there is 200 fathoms, and so perpendicular are the shores that 80 fathoms were found within a few feet of them.

A temporary anchorage in a small sandy bight close within Passage Point, the eastern entrance of the arm, with 13 fathoms, will be found, but open to a long reach of the sound to southward, and exposed to south-west winds; it is therefore not recommended. Another is on Resolution Island, in a bight $2\frac{1}{2}$ miles northward of Passage Point, bearing S.W. by S. from south entrance point of Wet Jacket Sound, with 9 to 12 fathoms; and a vessel may secure to the trees.

Wet Jacket Sound, about half way through this passage, extends six miles E.N.E., with a width of about one-third of a mile. Anchorage may be obtained at its head in from 18 to 10 fathoms.

Occasional Cove, on Resolution Island, near the north entrance of the arm, three miles from Wet Jacket Sound, has anchorage in 16 fathoms (with a hawser to the shore), the entrance of Breaksea Sound is just shut in from it.

Outer Coast of Resolution Island trends N.N.E., and is lower than the neighbouring land. Two miles northward of Five Fingers Point, a

quarter of a mile off shore, is a small islet, 70 feet high; half a mile S.W. $\frac{1}{2}$ S. of the islet is a smaller rock and reef, and half a mile farther in the same direction, a rock which occasionally breaks. These latter dangers extend more than half a mile from the shore, which should not be approached here within half a league. The coast line is now nearly straight for seven miles to Wood Hen Cove, which only shelters boats; from it the coast rounds away north-east towards Breaksea Sound.

Breaksea Sound.—Breaksea Island, off the entrance to the sound, is three miles round, considerably lower than the land of the main, and 12 miles from Five Fingers Point; the entrance being narrow, with very high land on either side, is not easily distinguished until within a few miles, when Breaksea Island and the smaller islets on the south side of the entrance will be readily made out; from seaward also, it is remarkable from the comparatively low land southward, the first craggy mountains north of Five Fingers Point rising over its south side.

There is a passage on either side of Breaksea Island; that northward is the best, being one mile wide and free from dangers. If the south channel is taken, pass between three small islands south of Breaksea Island and Gilbert Islands; this passage is about half a mile wide. A passage between Breaksea Island and the three small islands is not recommended, a long reef extends from the south side of the former, rendering it very narrow.

Gilbert Islands, two distinct groups, over half a mile apart, extend off the south entrance point, with an apparently deep bight between them, which offers no shelter. The only anchorage between them is Stevens Cove, on the mainland just within the eastern group, to enter which pass between the two easternmost; it is a small place, with a depth of four fathoms, sufficient only to hold one vessel of moderate tonnage by securing to the trees; sand flies are so numerous that it is scarcely possible to remain on board during the day.

One mile above the eastern Gilbert Island, in the middle of the sound, off the arm leading to Dusky Sound, is Entry Island. From it the sound runs north-east eight miles, when it divides into two arms, one continuing to the north-east six miles farther, the other eastward the same distance; the depth in both is very great. Half a mile above Entry Island 210 fathoms were obtained, three miles above, under a high cliff on the north shore, no less than 284 fathoms; in the arms it is scarcely less, until at their very extremes, where alone anchorage may be had.

On the south side, $2\frac{1}{2}$ miles above Entry Island, inside the Harbour Islands, which extend for three miles along that shore, is the best anchorage, in 12 fathoms, off a sandy beach, between the outermost island and the main, with excellent shelter; it may be entered either southward of the first island, or round the north end of the second island; the latter is the widest and best passage. Within the islands above this the water is too deep for anchorage, as also in First, Second, and Third Coves, on the north side of the sound.

Daggs Sound* is 12 miles, N. by E. from Breaksea Sound; the coast is steep and cliffy, overlooked by high mountain ranges; midway between, a slight indentation occurs, and a break in the mountains through which flows Coal River. Between which and Breaksea Sound are some high black rocks, one-third of a mile off shore, also smaller scattered rocks, the same distance off the projecting points. A cluster of rocks extend a quarter of a mile off the south entrance point; one mile north of the north entrance head is a remarkable rocky peninsula point.

* A remarkable scene occurred during our stay in this sound. Our anchorage was at the head of the northern arm, a cable's length from the shore, in 12 fathoms: the change of the moon brought a N.W. gale, with heavy rain, and in the course of a few hours no less than fourteen magnificent cascades were pouring down the steep sides of the mountains (upwards of 3,000 feet high), by which we were surrounded, bringing with them trees of considerable size, and all other obstructions met with in their passage. The effect was as if a heavy surf were breaking round the vessel; the mist, floating as low as our mast-heads, occasionally obscured everything but the summit of the mountains and the foam below, and produced altogether a scene as grand as it is possible to conceive, which lasted without abating in any degree for two days, when the water alongside, which had been as salt as the ocean, was for a considerable depth below the surface perfectly fresh.—Remark Book of Commander G. H. Richards, H.M.S. Acheron, 1851.

The entrance is one mile wide, decreasing within to four cables; the trend of the sound is E. by S., nearly five miles, when it branches into two arms, one N. by W. for two miles, the other south-easterly the same distance. In the entrance and for $1\frac{1}{4}$ miles within there are from 20 to 30 fathoms, sand, but as soon as the channel narrows, the depth increases to 70 and 90 fathoms. A bank nearly in mid-channel, with four fathoms at low water and deep water all round, lies $2\frac{1}{4}$ miles within the north entrance point, half a mile above where the channel begins to narrow, rather on the north shore. There is anchorage at the head of the north arm, in 12 to 18 fathoms, two cables from a stony beach, with streams of fresh water running through it. The south-east arm runs two miles in that direction, then north-east, terminating in Jacob's Creek, very narrow, with 8 to 12 fathoms in it.

Doubtful Sound lies seven miles N. by E. from Daggs Sound, the intervening coast of the same character as that southward; its entrance, two miles wide, with high mountains on either side, presenting a wide opening seaward, is clearly distinguished from a long distance. Allround Peak and Mount Groznoz, on its northern side, 4,000 to 5,000 feet high, are very striking; Nea Islets extend southward from the north entrance head; three cables off the south entrance point are two remarkable peaked rocks, the Hare's Ears.

Doubtful Inlet trends E. by S. $\frac{1}{2}$ S. 17 miles, with three arms on its south side extending three to four miles southward; on the north side Secretary Island, extending ten miles north and south, and five miles in its widest part, separates the entrance from Thompson Sound, with which it is connected by a short arm eight miles within the entrance.

Nea Islands extend south-eastward one mile from the north head, and contract the entrance between them and Hare's Ears Rocks to a little over $1\frac{1}{4}$ miles, with a depth of 50 to 60 fathoms; a reef awash extends a quarter of a mile S.W. by S. from the northern Nea Islet.

Two miles within Bauza Island, three miles long, lies in the middle of the channel, with deep water on either side, but Gaol Passage on its south side is best; its average width is less than half-a-mile. The channel northward of Bauza Island, at its eastern end, is not over a cable across, the winds are generally unsteady.

From the north-west end of Bauza Island a rocky group—Shelter Islands—extend north-west in two parallel lines, with a passage between $1\frac{1}{2}$ cables wide, and a depth of 12 fathoms; at the south-east end of the northernmost cluster small craft moor in 10 fathoms between them. The passage between Shelter Islands and the northern shore, and between them and Bauza Island is not recommended for large vessels.

One-and-a-half miles above Flurry Head (the east point of Bauza Island), is a small anchorage in Blanket Bay, $1\frac{1}{2}$ miles eastward of which is Common Head, the south-eastern extreme of Secretary Island; between it and Wood Head, a mile to the south-east, is the passage northward to Thompson's Inlet, three-quarters of a mile across, with two small islets on its eastern shore.

One mile south-eastward of Flurry Head is First Arm, running nearly three miles S.W., with a width of three cables, and depth of 30 to 50 fathoms, and anchorage in Snug Cove at its head in 12 fathoms, a quarter of a mile from the beach. Smith Sound, the main branch, continues the E.S.E. trend, averages a width of $1\frac{1}{4}$ miles, with no spot where a vessel could anchor.

Crooked Arm, four miles above First Arm, runs southward $2\frac{1}{2}$ miles, then turns sharp westward an equal distance, with a high precipice on either side its breadth is half a mile; in Haul-ashore Cove, at its head, is anchorage in 12 fathoms, three cables off the beach, through which flow large streams.

Above Crooked Arm the sound trends more southward; its width half a mile. On the north shore, $3\frac{1}{2}$ miles above, is a solitary mountain cone, abreast which, in the centre of the channel, is a small round islet. Immediately above on the north shore is Elizabeth Island, with a channel on either side; and a mile above Elizabeth Island is Deep Cove, its northern side a steep precipice. The Lyvia River runs into its head. There is no

anchorage in it. Rolla Island, a small round islet, lies off its south entrance point. Hence Hall's Arm runs S.S.W. four miles. Its entrance, one mile above Rolla Island, between a steep cliff on the western shore and a cliffy peninsular point on the eastern. N.W. by N. two cables from the latter is a reef awash. The width between the entrance points is a quarter of a mile. Within it opens out to three-quarters, with a long beach of sand and shingle on the eastern shore, a cable off which there is no bottom with 70 fathoms. Above this the arm narrows gradually to its head, which is within two miles of an arm of Breaksea Sound.

In the main arm there is rarely less depth than 120 fathoms, in the smaller branches 40 to 70 fathoms, and the few anchorages mentioned above are not easily found by sailing vessels.

Thompson Sound.—The western shore of Secretary Island, forming the coast line between Doubtful and Thompson Sounds, runs N.N.W. eight miles to Colonial Head, the north extreme of the island and south entrance point of the inlet.

The main arm trends south-eastward 10 miles to its junction with Doubtful Inlet, when it turns north-eastward for eight miles, thence south-eastward four miles. The entrance, half a mile wide, is free from dangers, with a depth of 75 fathoms. Open Cove is $1\frac{1}{2}$ miles within on the east shore, with 15 to 20 fathoms in it, but exposed to north-west winds. Two miles southward of Open Cove is a projecting peninsula, with a deep indentation on either side of it. Neck Cove, on the north, with several rocks in it, is open and exposed.

Deas Cove (see plan), on its south side, though small, is a secure and sheltered anchorage; it runs N. by E. for three cables, with a width less than one cable; the depth is from 6 to 16 fathoms. On the west shore the cliffs are steep-to; the eastern shore shoals for a short distance off. The anchorage, in 10 fathoms, a cable from the sandy beach at the head, is the only convenient one. H.M.S. Acheron secured also with hawsers to the shore.

From Deas Cove the average width is three-quarters of a mile to Common Head; the depth of water is very great. Hence Bradshaw Sound runs N.E. by E. 8 miles, similar in feature to the outer part. McDonald Island lies close off its north shore $1\frac{1}{2}$ miles from the head; in the bay immediately westward is anchorage in 10 fathoms a quarter of a mile from the shore. "The anchorage inside McDermott's (query, McDonald) Island is 15 fathoms, is good and well sheltered, but not nearly so large as the charts and directory lead one to suppose."—Capt. Simpson, H.M.S. Blanche. Precipice Cove, the head of the sound above McDonald Island, is bounded by high perpendicular cliffs; very close to its head, which terminates in a river, there is 10 fathoms; from abreast McDonald Cove, Gaer Arm runs south-eastward four miles, with three low islands at its head, outside which it dries at low water; anchorage may be had in Shoal Cove at its head, in 14 to 6 fathoms, half a mile from the islands.

Nancy Sound is three miles from Thompson Sound, is well denoted by Turn Peak, a conspicuous sharp-peaked mountain over its northern side 4,120 feet high, which may be distinguished a long distance seaward, and presents the same appearance from any point. Within five or six miles of the port a remarkable reddish patch will be seen on the high land immediately northward of the entrance, also a white patch on the lower parts of the cliffs both north and south of the heads, two ragged islets project seaward from the south entrance point 2 cables; Entrance Islet, a flat-topped rock, 50 feet high, lies off the north entrance point; the channel southward of this rock is not more than three cables wide, with a depth of 30 fathoms; but this bank does not continue sufficiently far within for anchoring.

The trend on entering is E. $\frac{1}{2}$ S. for $1\frac{1}{4}$ miles, when it expands to a width of three-quarters of a mile, and runs south-eastward nearly five miles, gradually decreasing in width to $3\frac{1}{2}$ cables; the shores steep-to on either side. A small islet lies close off Bend Point, the upper north point of this arm; half a mile S. by W. $\frac{1}{2}$ W. from this islet there is anchorage in 15 fathoms in Heel Cove, a hundred yards from the stony beach; hence the

sound turns abruptly N.E. by E. for two miles, with a width of $3\frac{1}{2}$ cables, and terminates in a stony beach, where anchorage may also be had close to the shore; the soundings in this arm are 70 to 30 fathoms; in the outer arm 130 to 90 fathoms.

Charles Sound is four miles N.N.E. of Nancy Sound; on the coast between are one or two boulder beaches. Turn Peak, midway between it and Nancy Sound, is a good guide to the entrance; from the points to the northward several scattered rocks extend; one detached is a quarter of a mile from the shore.

The trend for four miles is S.E., with a width of half a mile; the depths at the entrance are 38 to 55, increasing within to 110 fathoms. Three miles from the entrance, close to the north shore, is a small islet, with a cove within, exposed and too small for anchorage; there is good landing for boats on the upper side of the islet; one mile above this the sound divides into two arms, one running E. by N., the other S.S.E., each three miles, with an average width of three cables, and depth 30 to 50 fathoms.

Eleanor Island, at the entrance of the eastern arm, has a deep channel on either side. Near the head of the southern arm are two small groups of low islands, with three rocks above water eastward of the first group; these rocks and islets must be passed on their eastern side; anchorage may be had above the rocks in 14 to 20 fathoms. Vessels are not recommended to run for Charles Sound; there is no convenient anchorage, and the sounds on either side are to be preferred.

Caswell Sound.—The coast between Charles and Caswell Sounds, a distance of three miles, is extremely rugged; a ridge of high rocks extends three cables off shore midway between. Unlike any other part of this coast, the water is shoal for a short distance off, with irregular bottom. Twenty to thirty fathoms will be found half a mile off, but vessels should not approach nearer than one mile.

The entrance is narrowed by an island off the south head, with a small reef awash off its north end, to $3\frac{1}{2}$ cables between the reef and the north head. Southward of the island is a boat channel, with a sunken rock in its outer entrance. A narrow belt of comparatively shoal water extends partly across the entrance half a mile outside the island, with 20 to 40 fathoms on it; immediately within there is no bottom at 120 fathoms.

The trend is S.E. $\frac{1}{2}$ S. for $1\frac{1}{4}$ miles from the north head when it turns eastward and increases to the width of one mile; $2\frac{1}{2}$ miles within, on the south side is Dog Point, whence the sound runs E.S.E. $2\frac{1}{2}$ miles, narrowing gradually to half a mile. The shores are very steep on either side.

Close to the north shore, at the head of this reach is Boat Rock, awash at high water; a shoal patch of sand extends round this rock, on which, just above the rock a vessel may drop her anchor in four fathoms if necessary, but it is very steep. Hence the sound runs easterly three miles; the best anchorage is $1\frac{1}{2}$ miles above Boat Rock, in a small bight eastward of a wooded islet, detached from the north shore, in 12 fathoms, but a hawser should be carried to the trees on the east point of the cove, to prevent being driven off the steep bank. The depth above Boat Rock is 80 to 20 fathoms; at its head is a shallow flat.

George Sound.—From Caswell Sound an iron-bound coast, broken by two small bights—Two Thumb and Looking-glass Bays—trends N.N.E. $\frac{1}{2}$ E. for 13 miles, to George Sound. Two Thumb Bay, three miles north of Caswell Sound is a mere indentation; rocks front the shore for three miles northward to Looking-glass Bay, which extends eastward one mile, a quarter of a mile wide at its entrance, but wider within. The depth is nine to seven fathoms, sand, with a round beach at its head of large boulders. It is open to the westward.

The Houserock, a remarkable rock of that shape a short distance off shore, is $2\frac{1}{2}$ miles northward of Looking-glass Bay. From it the coast trends slightly more to the eastward, broken with shingle beaches, for four miles to George Sound.

George Sound runs first S.E. $\frac{1}{2}$ S. seven miles, nearly one mile wide. Twenty-two fathoms were found half a mile off the south head, rapidly deepening within to 106 fathoms. Except two small rocky islets on the

eastern side, two miles within the entrance, and a rock awash one mile within the south head, nearly a cable off shore, the shores are free from danger. This sound is easier of access and egress than most. The width is greater, and the winds generally blow with more steadiness up and down it.

Anchorage Cove has good anchorage in 15 fathoms on the north shore, six miles within the entrance. With north-west gales a swell sets in, but by hauling over to the north shore and securing to the trees a vessel will lie in smooth water. Its head is a sandy beach, through which flows a rapid river, with two feet on its bar at low water. One mile above, the sound trends E.S.E three miles, and then sends off two arms south-east and south-west, the latter for three miles and the former $1\frac{1}{2}$, with an islet towards the head of each. At the head of the south-east arm is a small cove, and about 200 feet above the level of the sea is an extensive lake, whose superfluous waters cause a considerable outset in the harbour. The depth of water in these arms is 40 to 14 fathoms.

George Sound is surrounded by mountains of the most rugged and precipitous character, nearly 5,000 feet high.

Bligh Sound is six miles N.E. by N. from George Sound; the coast is clifty, slightly indented, and the same character as that already described. Two remarkable mountains, three miles within the north entrance point, Mount Longsight and Table Mountain, the former 4,600 feet high, will point out the entrance from a long distance seaward in clear weather.

This sound has three reaches; the outer, two miles in width at its entrance, runs S.E. by E. $3\frac{1}{2}$ miles, narrowing gradually to two cables at Turn-round or entrance point of the second reach. The depth between the heads is from 30 to 40 fathoms, deepening rapidly within. From Turn-round Point the second reach turns sharply S.S.W., $4\frac{1}{2}$ miles, with a width of half a mile and a depth of 70 to 80 fathoms. On the eastern shore of this reach, three-quarters of a mile from its head, is Amazon Cove, a small craft anchorage; above it, the Third Arm or Bounty Haven turns sharp to S.S.E., carrying a width of four cables for $1\frac{1}{2}$ miles to its head, where there is good anchorage in 12 fathoms close to a stony flat, through which flows a considerable stream; wild-looking lofty mountains rise abruptly from either shore. From the narrow bends of this sound, it would be difficult for sailing vessels.

Clio Rock, with nine feet, lies in the second reach half-way between Turn-round and Evening Points; it is the outer rock of a cluster surrounded by very deep water, $2\frac{1}{2}$ cables from a bluff point on the eastern shore of the sound; between it and the point are two rocks of similar character, with about six feet over them.

From the rock Bare Cone bore W.S.W., Turn-round Point N. by E. $\frac{3}{4}$ E., Evening Point S. $\frac{1}{4}$ W.

CAUTION.—Mariners are cautioned that Bligh Sound being similar in its features to the other sounds, in having deep soundings close to steep and precipitous shores, that though the existence of detached rocks is considered quite exceptional, still vessels must use due precaution, as similar dangers to the Clio Rock may exist where the present surveys imply the usual deep water.

From Bligh Sound to Milford Sound, a distance of sixteen miles, the coast continues its N.E. by N. trend, broken by Little and Poison Bays—both unfit for anchorage—which are three and eight miles respectively from the former sound, the coast between them projecting to the north-west about one mile from the general trend.

Milford Sound, the northernmost of the series now described, though comparatively inconsiderable in extent, yet, in remarkable feature and magnificent scenery, far surpasses them all. The mountains by which it is surrounded are the highest on the coast (with the exception of Mount Cook, 120 miles north-eastward). Pembroke Peak, three miles inland, perpetually snow-capped, rises over its northern side to a height of 6,700 feet; Llawrenny Peaks, a remarkable saddle-backed mountain, attain nearly the same elevation on the southern side; but the most striking features are the remarkable shaped Mitre, rising abruptly to a height of 5,560 feet immediately over the

south side of the sound; and a dome-shaped mountain on the opposite shore, nearly bare of vegetation, which from its peculiar colour resembles a huge mountain of metal; these Alpine features and its narrow entrance, apparently still more contracted by the stupendous cliffs which rise perpendicular as a wall from the water's edge to a height of several thousand feet, invest Milford Sound with a character of solemnity and grandeur which description can barely realise.

From seaward, the entrance makes as a bay, of which St. Ann's is the south, and Yates the northern point; they are five miles apart in a N. $\frac{1}{4}$ E. direction; near St. Ann's Point is a remarkable jib-shaped white stripe.

Brig Rock, 10 feet above water, three-quarters of a mile outside the line of the points, bears N. by W. distant three miles from St. Ann's; it is one and three-quarters miles from the shore, with a reef encircling it a distance of two cables. Capt. Fairchild says "it lies $1\frac{1}{2}$ miles from the shore, and has some dangerous rocks half a mile to the westward of it, which only break in bad weather."

Anita Bay (see plan on sheet chart).—St. Ann's Point is low and rocky; Fox Point, with a small islet close off it, lies half a mile south-east of it, and immediately round it, in Anita Bay, there is anchorage in 12 to 18 fathoms, with the islet north, about a cable distant. Here a vessel will be sheltered from north-west winds, but with winds from north a swell rolls round the point.

From Anita Bay the sound runs funnel-shaped S.E. $\frac{1}{2}$ E. $1\frac{1}{2}$ miles, when the narrow entrance is reached, it here barely exceeds a quarter of a mile in width, towering perpendicular cliffs rise on either side, the soundings in mid-channel being 60 fathoms; the sound then trends easterly and S.E. by E. $6\frac{1}{2}$ miles between stupendous cliffy walls, the widths varying from one-third to three-quarters of a mile; a cable from the highest cliffs on the north shore, near a large waterfall, 214 fathoms mud was obtained. Four miles within the entrance, on the north shore, is Harrison Cove, a confined and deep water anchorage, with a steep and winding valley running down from it to Pembroke Peak.

FRESHWATER BASIN (see plan on sheet chart), the head of Milford Sound, terminates in two coves or basins separated by a low tongue of wooded land fronted by a steep-to tidal boulder bank. In the eastern (Freshwater Basin) H.M.S. Acheron moored in 12 fathoms; it is only 100 yards wide at its entrance, with a bar of $3\frac{1}{2}$ fathoms at low water, opening out within to the width of a cable; a magnificent waterfall of 700 feet close to the entrance serves as a guide to it. The western cove is larger, with a greater depth of water inside, but its entrance is shallower. ("The available space for anchorage is decidedly less than is shown on sheet 12; and the entrance is shoaler, $3\frac{1}{2}$ fathoms at half tide being the greatest depth in the channel. It is, however, the best to be obtained in this sound."—Captain Simpson, H.M.S. Blanche.

Coast Northward of Milford Sound.—From Milford Sound to Yates Point, 5 miles N. by W., the high wooded slopes are fronted by sandy or shingle bays, with straggling rocks extending some distance off the points. The channel within the Brig Rock has not been examined; vessels are therefore recommended to pass outside; 20 fathoms, sand and gravel, will be found half a mile from it.

From Yates Point the coast trends N. by E. $\frac{1}{2}$ E. 12 miles to Kaduku river; two miles northward of Yate's Point, half a mile off shore, is a patch of detached rocks; again northward are three deep sandy bays, the middle one of which is Martin's Bay.

Martin's Bay, in $44^{\circ} 20' S.$ The Kaduku or Hollyford River, flowing out of Lake Kakapo, runs into this bay, navigable for small vessels into the lake; there is a perfectly easy pass of only 1,400 feet above the sea between this and the great lake Wakatipa (the north-western extreme of the Otago goldfields). According to the chart rocks project some distance off the point immediately north of the entrance to the river.

From the projecting rocky point of Awarua, three miles north of this river, the coast trends N.N.E. 25 miles to Cascade Point, apparently free

from dangers, excepting the Seal Rocks, a short distance off shore about midway between the two points, and a small rocky islet three miles southward of Cascade Point half a mile off a sandy beach. The land immediately over the coast is steep, of moderate height, but backed by lofty rugged ranges; Barn Bay, six miles southward of Cascade Point, has a remarkable sharp peak over its south point, off which are two barn-shaped islets.

Cascade Point is a steep projecting bluff or line of cliffs of moderate height, bare and striped by numerous falls of water, visible after rain a considerable distance seaward. Immediately south of these cliffs near the coast is a remarkable dome-shaped mountain, and inland a snow-capped range of great height, with peaks of every variety of shape and ruggedness.

From Cascade Point the projecting point of Jackson Bay is N.E. by E. $\frac{1}{2}$ E., $11\frac{1}{2}$ miles; it is a remarkable point rising boldly from the sea with a low neck, separating it from higher land, readily recognised from any direction; the coast between it and Cascade Point is a sandy bight; that to the eastward a sandy beach 20 miles in extent, with low land a few miles in from it.

SOUNDINGS.—There are 48 fathoms, rocky bottom, between Cascade Point and Jackson Bay, four miles off shore; a heavy swell generally sets on this coast, rendering a cautious approach necessary.

Jackson Bay, at the south end of the sandy beach just mentioned, is occasionally visited by whale ships from the facility of gaining or leaving the anchorage, as also for chance supplies; it affords good protection from southerly or westerly winds, and some shelter even as far round as N.N.W.; between that and N.E. it is perfectly open. Jackson Point must be given a berth of half a mile, as several rocks above water and awash extend nearly that distance from it; on rounding these rocks a small conical islet, with bushes on the summit, will be seen a short distance from the western shore; the anchorage is in seven fathoms sand, a short half-mile to the S.E. of it.

There is no difficulty in quitting Jackson Bay at the commencement of a north-west gale. It would not then be prudent to remain, as in the event of the wind backing round to the north a vessel would be exposed to great risk. Northerly gales* are generally preceded by a swell setting into the bay. Boats can only land on the beach in moderate weather. To the north-east of the river, two miles from the anchorage, there is always a surf.

With the exception of the roadstead under Cape Foulwind in southerly winds Jackson Bay is the northernmost anchorage on this coast, where shelter can be procured for large vessels.

CURRENT.—The current which sets southward nearly one mile an hour along the south-west coast of South Island is not much felt northward of Milford Sound. Off Jackson Bay it may be said to cease.

Coast North-east of Jackson Bay.—From Jackson Bay the general trend of the coast is N.E. $\frac{1}{2}$ N. for 80 miles, as far as Abut Head. The first 20 miles is a nearly straight sandy beach, with two small rivers towards its northern end. Three conical wooded hills rise out of the low land, inland from this beach. The southernmost—the highest—is two miles from the beach, and bears East six miles from the anchorage in Jackson Bay.

Taumaki, or Open Bay Islets, a small rocky group lying off the coast three miles from the beach, bear from Jackson Point N.E., 13 miles. They are surrounded by sunken rocks, extending nearly three miles south-west, and one mile westward and north-east. Vessels should pass outside this group. Three miles westward of them there are 17 fathoms, increasing to 30 shortly after passing them to the northward. Several dangerous rocks have been discovered in the neigh-

* Northern gales generally commence at N.N.E., with clear weather, veering to north-west, with heavy squalls and thick rain. From this point the gale is most severe, and if disposed to last will back round again to north. A shift to the south-west is generally preceded by a lull with heavy rain, and at the latter point again blows hard, but the gale is then of short duration, and soon subsides into a moderate breeze, with fine weather.

Gales are not so frequent here in summer, though their directions are much the same. South-west and W.S.W. winds then prevail.

bourhood of these islands, and as coasting steamers frequently pass inside, caution is required in doing so, until the nature and position of the several dangers have been determined by further examination.

ANCHORAGE.—The anchorage under Open Bay Islets, as described by Captain Kerley of the Bruce, is sheltered from all quarters, and may be safely used by any vessel. It is under the east side of the main island, from the northerly point of which a reef runs some distance towards the mainland, forming an excellent breakwater to a heavy sea from north and north-east. Another reef to the southward breaks the force of a south and south-west sea. A rapid current ran south past the island whilst the Bruce remained there; its rate was estimated at between three and four miles an hour.*

Haast River runs into the sea between Open Bay Islets and Arnott Point; its entrance, in about 43° 51' S., is navigable for small vessels.

Arnott Point and Mount Cook.—Seven miles from the north end of the long sandy beach is Arnott Point, the first projecting cliffy headland north of Jackson Bay, with a high conical hill over it; the great Southern Alps here send their steep spurs down to the coast; in clear weather the summit of the snow-capped Mount Cook, distant 50 miles, will be seen rising in two distinct peaks 12,000 and 13,200 feet above the sea, with their base generally enveloped in clouds; this is the highest mountain in New Zealand, and justly bears the great navigator's name.

Coast from Arnott Point to Abut Head.—From Arnott Point the coast is cliffy and almost straight for 15 miles to Tititira Head, with scattered rocks extending off the points about one-third of a mile; the soundings five miles off shore vary from 60 to 46 fathoms, sand; on the next 18 miles of coast are three sandy bays, their projecting bluffs having the appearance from seaward of islands lying near the coast; the northernmost, the most extensive, has a remarkable range of turreted parapet land near the coast, its north bluff being a conspicuous yellow cliff. Mount Cook is only distant 18 miles from this part of the coast. Abreast these sandy bays the off shore soundings decrease, varying from 46 to 33 fathoms, dark sand and mud, at the distance of 10 miles.

Bruce Bay† lies between Makawiho and Heritanewha Points, and resembles Jackson Bay, though smaller. The anchorage, close under the south head, in three fathoms, with hard speckled sand but apparently good holding ground, is well sheltered from southerly winds. The south head is a bold rocky promontory stretching out a mile and a half in a north-west direction, forming the shelter; in the adjoining bay southward the same headland affords protection from the only winds to which Bruce Bay is exposed. The vicinity of Bruce Bay to Haast River and the gold diggings in that locality renders it an important place of shelter.

From yellow Cliffs (Otorokua Point, about 14 miles north-eastward of Bruce Bay, is by the recent surveys in 43° 24' 50" S. The chart gives 43° 26'. See also remarks on page 187 about coast line); the coast is a succession of rocky points and bluffs, with occasional sandy beaches between, to Abut Head. Long Point or Kohuamarua Bluff (nine miles S.W. from Abut Head), tapering to the sea, terminates in a low cliffy extreme. White Head, two miles further north, is a bluff point of that colour. Abut Head is a strikingly bold headland. Eight miles south-west of it is Okarito Lagoon.

Okarito Lagoon, with a river of the same name, is a regular tidal harbour, the sea flowing and ebbing with great velocity. The flood runs in one hour after high water in the offing.

The entrance is practicable for vessels of light draught, there being 14 feet over the bar at high-water springs. The present channel runs north-west and south-east. Vessels entering should keep well over to the south shore until abreast the north spit, and then stand straight across for the opposite side to avoid the current setting upon a middle shingle bank.

About a quarter of a mile from the entrance the channel is divided by an island into two branches, the northern navigable for nearly two miles,

* The information relating to an anchorage under Open Bay Islets is extracted from the *Lyttelton Times*.

† From the authority of Captain C. W. Hope, H.M.S. Brisk.

with four to six feet at low water. The southern arm has the same depth for about one-eighth of a mile.

The holding ground is very bad, and vessels must not trust to their anchors and cables if moored in the tideway.

The coast northward of Okarito for six miles is a low sandy bank covered with coarse grass and flax; half a mile southward is a high rocky headland from which foul bottom apparently extends some distance north-westward.

Coast from Abut Head to the N.E.—From Abut Head to Matungitawau Point, N.N.E. $\frac{1}{2}$ E. 60 miles, the coast is for the greater part low and sandy, falling a little back from a straight line, with few remarkable features. The mountain ranges, of moderate elevation, recede from 20 to 30 miles from the coast.

CLIFFY HEAD.—N.E. $\frac{1}{2}$ N. 9 miles from Abut Head, is a clifty projection about three miles in extent, the intervening coast of low cliffs, fronted by a sandy beach.

Wanganui River is $7\frac{1}{2}$ miles from Abut Head, with a remarkable hill or headland, close to the coast, over its south bank; the entrance is very narrow, and unsafe for vessels of any description; the South Spit overlaps the mouth and runs a considerable distance northward, where, from the coast being rockbound, a vessel endeavouring to take the bar, and stranding, would be wrecked.

CAUTION.—The coast between Wanganui and Okarito should be approached with caution, as the rocks from the headlands apparently run a considerable distance seaward.

Bold Head (Paramata).—12 miles N.E. of the Clifty Head is Bold Head, a bluff point, standing out from the low coast on either side of it; but lying in a recess of the coast, it forms no prominent object from seaward.

Hokitika River (see page 38).—The following is furnished by Capt. Turnbull, Harbourmaster:—"It is H.W. F. & C. at 10h. 20m.; average rise, spring tides 9 feet, neaps 6 feet. The tides on the coast are influenced by the winds: a northerly wind keeps them up and higher than usual, a S.W. wind cuts the tide short. At the flagstaff on the south side of the town a semaphore is used to guide vessels; conical moveable beacons to mark the best channel over the bar are shifted to suit the channel; they are from 20 to 25 feet high, surmounted with a red flag. The beacons on the south side are covered with a white painted cloth; a black and white chequered strip one foot wide runs down the centre of the front beacon, the back beacon has a black band across, 18 inches wide. When the channel trends southward, or when beacons are required on the North Spit, they will be found on the beach facing the town, painted *red* to distinguish them from the houses in the background, and when used are also surmounted with red flags. In addition to these beacons, iron rods are used to mark the different spits and banks where required along the channel, surmounted with red flags on the starboard hand on entering and white on the port. Strangers should pay every attention to the semaphore arm. A fixed white light, 130 feet above the sea, visible in clear weather sixteen miles, is shown from a white tower on the first terrace north of the town, one mile north of the flagstaff. For the convenience of steamers working the bar at night a red light is shown from the back beacon on the South Spit and a white light from the front one; these in line lead over the bar in the best water; it is not advisable for strangers to use them at night. Should the channel trend south and the north beacons be required a red light is used on each beacon to distinguish them from the lights in the town. Extensive harbour works—although only partly finished—have already done much toward its improvement, the tidal area having increased over two-thirds during the last twelve months. Until the works are finished no permanent sailing directions can be given.

"Hokitika Roadstead is exposed to all winds from north to S.W. The best anchorage is in 10 to 15 fathoms, the flagstaff bearing about E. by S. Shipmasters would do well to keep close to the bar on tide time and also to windward, thereby saving much valuable time when a chance of towing-in offers. Before and during northerly gales the current runs southward along the coast, and at times has been found setting off shore; the change of wind

changes the set to N.E. The N.W. sea is felt at Hokitika long before the wind has veered to that point from N.E.; a heavy send home is felt, especially with a falling barometer, whilst the wind is blowing strong from W.N.E. Westerly gales rarely blow home, but send a heavy sea on the coast; a vessel 50 miles off shore would in all probability experience a hard W.N.W. gale, whilst the wind in-shore would be N.N.E. The off-shore ground is the safest at those times. Much lightning seen to S.W. and west, especially in winter, is a sure sign of stormy weather, with very heavy squalls of hail and rain, especially with a low glass. The coast is clear of known outlying dangers."

A constant heavy westerly swell rolls in on this portion of the coast; the prevailing gales blow from north-west, south-west, and south-east, enabling vessels to lay well off shore and obtain an offing, but masters of vessels should watch the weather carefully, and if threatening, put to sea in good time.

The heaviest break is immediately outside the bar, in 2 fathoms water; the bar is constantly shifting in direction and varying in depth; after a heavy fresh, the stream of the river runs straight out to sea, and during an interval of moderate or fine weather the sea piles up either the northern or southern spit. (Fresh directions will be necessary when harbour works are completed.)

ANCHORAGE.—The best anchorage off Hokitika is in 15 fathoms, with the flagstaff bearing E.S.E., distant $2\frac{1}{2}$ or 3 miles, veering cable to 60 or 70 fathoms; this is in good holding ground, and a vessel may here ride in safety except with westerly winds. "A green light is shewn at the north end of the west protection wall, during tide time at night, while vessels are passing in or out. It has no connection with the beacon lights."—N.Z. Gazette, 1880.

Teremakau River is midway between Grey and Hokitika Rivers. At the present time it empties itself into the sea by two channels, one running northwards, nearly dry at low water, the other in a south-west direction, with five or six feet water in it. ("There is a dangerous snag in this channel."—"Nelson Almanac," 1880.) Small vessels drawing four or five feet water could cross the bar without incurring greater risk than at either of the Hokitika or Grey Rivers.

It is H.W. F. & C. at Teremakau River at 9h. 55m.; mean rise 9 feet.

Grey or Mawhera River,* in $42^{\circ} 26' S.$, $171^{\circ} 12' E.$ (see page 38), runs in an easterly direction about 12 miles, when it divides, one branch taking a northerly and easterly the other a south-easterly direction, communicating with the Brunner Lakes, whence there is a pass to the Canterbury Plains.

Grey River has a bar at the entrance, which is constantly shifting, rendering the navigation entirely dependent on local pilotage. After a heavy fresh, the channel breaks out straight in a westerly direction, safe and easy of access for vessels drawing eight or nine feet of water. In the absence of a fresh the channel makes either north or south, but usually to the north, running for a short distance nearly parallel with the coast line. At such times the entrance is far more dangerous than that of Hokitika, because in crossing the bar the sea takes the vessel on the beam when in the heaviest break, and, unless under command with very small helm, she is in danger of being stranded on the beach before getting in a position to keep away for the entrance of the river, which, although deep, is very narrow.

"Recent surveys—as far as completed—only embrace the coast from Jackson's Bay (which is correct on the charts) to Grey River. The whole of the coast line between these points is more or less out in the charts. It may consequently be inferred that the coast lying north of the Grey is to some extent inaccurate. Mariners are therefore warned to exercise great care in approaching, or in coasting the land at night. As an additional incentive to caution, it has several times been reported by the commanders of steamers on the coast that it is necessary to steer half a point westward of the courses indicated by the charts, in shaping a course from Perpendicular Point to clear Cape Foulwind. The above notice—published at the request of Commodore Lambert, will affect sheets 13 and 14."—From the "Wellington Almanac," 1879.

* From the authority of Captain C. W. Hope, H.M.S. Brisk.

The following is supplied by Captain Allardyr, Harbourmaster at the Port of Greymouth:—

"GENERAL TIDE AND BAR SIGNALS.—White balls, owing to the often changing of the channel, moveable beacons—painted red, surmounted with red flags during the day—are used when best seen and required for crossing the bar. The back beacon has a broad black band across it. For night work with steamers a red light is kept on each beacon. These kept in one lead over the bar in the best water. In day time due attention must be fixed to the semaphore arm.

"Iron rods surmounted with flags are used on the spit ends when required. The red flag must always be kept to the starboard and white flag to the port hand in entering.

"Two stone groins on the south side of the river are in course of erection. At the end of each is exhibited a green light, from dark till daylight. Vessels must pass northward of them. It is H. W. F. & C. at 10h. 15m. a.m.

"There is anchorage with good holding ground in 10 to 15 fathoms water, with flagstaff bearing E. or E. by N. With good ground tackle vessels may ride out a pretty heavy gale.

"A white light is shown from the flagstaff, visible five miles in clear weather.

"A stone breakwater is in course of erection on the south side of the river. When completed it is expected that there will be 12 to 13 feet on the bar at low water."

The soundings between Abut and Bold Heads, 15 miles off shore from the former, is 49 fathoms. At 12 miles from the latter, 25 fathoms dark sand; proceeding northward there are 53 to 22 fathoms six miles off shore until abreast Teremakau River, between which and the Grey, at the same distance off, are 20 to 17 fathoms.

Matungi-Tawau Point, four miles N.N.W. $\frac{1}{2}$ W. from Grey River, is a remarkable double bluff of limestone cliffs, of moderate height, with a sandy cove between. Hence the coast trends N. $\frac{1}{2}$ E., with cliffy shores and scattered rocks extending in some parts half a mile off shore. The Paparoa Mountains, a snowy range, in places over 6,000 feet high, four leagues inland, runs parallel with the coast to Cape Foulwind; nearer the coast is a lower range, remarkable by its irregular outline.

Perpendicular Point, and **Ti-Miko Cliffs**, 16 miles northward of Matungi-Tawau Point, is a bold projection rising abruptly from the sea; this and the lower range of mountains render this part of the coast very striking. ("Brighton—Woodpecker Bay—is 20 miles southward of Cape Foulwind. Height, and times of high water, same as at Westport. A small river discharges into the bay, used by vessels of light draught in fine weather at spring tides. The Commercial Code is used at the signal station. The bay is exposed from N. to S.S.W., and a heavy sea rolls home with strong winds between those points."—*Nelson Almanac*).

The next projecting point, a saddle-shaped summit, is 10 miles northward, the **Five Fingers Rocks** standing half a mile off the coast, which is here formed of low terrace land. The highest peak of the snowy range, 6,500 feet high, is 15 miles eastward of this point.

Robertson Point, five miles N.N.E. $\frac{1}{2}$ E. from the Five Fingers Rocks, is the termination of the cliffs; a small river (Browning River) is just northward of it; here the high land recedes, and the country is low and thickly wooded, with a sandy coastline to Cape Foulwind, distant 10 miles. ("Charleston—Constant Bay—is 11 miles southward of Cape Foulwind, just south of Robertson Point. Range of tide and time of high water same as at Westport. The Commercial Code is used at the flagstaff. The bay is exposed to all winds from S.W. to N.N.W., and a heavy sea gets up with strong winds from any of these points. Waitakari (or Nile) River is one mile northward of Constant Bay, and is in some measure sheltered by Robertson Point from the S.W. There is six to seven feet water at the entrance during spring tides. It is seldom used, but is perfectly safe when once inside."—*Nelson Almanac*, 1880).

THE SOUNDINGS at six miles off, between Matungi-Tawau Point and this cape, vary from 30 to 50 fathoms sand.

Cape Foulwind (*Tauranga*) is remarkable by three rocks (the Steeples) which lie off it, also by the coast turning sharply eastward from it. The cape is a low cliffy point, well wooded, rising within to the base of the mountains southward. The coast, $2\frac{1}{2}$ miles southward of the cape, is fronted by rocky islets, within which, in the small sandy bay of Tauranga (Penguin Bay) the sealing boats land. Under Cape Foulwind vessels may find shelter in southerly winds.

LIGHT.—A *revolving white light*, showing a flash every half minute, 190 feet above the sea, and visible 19 miles in clear weather all round seaward where the land permits, is shown from a white tower 53 feet high, on Cape Foulwind, and is a good guide for vessels approaching this part of the coast or the Buller.

The Steeples, three conical rocks, visible 10 or 12 miles, show prominently from southward; they occupy a space of $1\frac{1}{2}$ miles, and bear N. $\frac{1}{2}$ W. from the cape, the northern extreme being $2\frac{1}{2}$ miles from it. Several smaller rocks awash are scattered within and about them; the narrow channel between them and the cape is rocky, and not fit for strangers or sailing vessels; it is seldom taken by the coasting steamers; the deepest water is between the mid-channel rock (itself or the break always visible) and the cape.

Coast from Cape Foulwind to Rocks Point.—From Cape Foulwind the coast recedes eastward, and forms an extensive bight, of which Rocks Point, N. by E., 54 miles from the Cape, is the northern limit; the depth of the bight from a straight line between the two points is five leagues.

FALCON ROCK is considered not to exist in the position formerly given, —midway between the Steeples and entrance of Buller River;—the rock seen was probably one of the known outlying dangers a few hundred yards E. by N. from the northern Steeple.

It is important that all craft trading to the West Coast rivers should be provided with good hawsers and a spare anchor.

Buller or Kawatiri River (see page 38).—The following is supplied by Captain Leech, Harbour Master, Westport, through the Secretary Marine Department:—"The flagstaff is in $41^{\circ} 46'$ S. and $171^{\circ} 42'$ E. The bar bears from the outer or northern Steeple E. $\frac{3}{4}$ N., distant $5\frac{1}{2}$ miles, and the same distance from Cape Foulwind, both of which shelter the roadstead and bar from the south-westerly winds and swell prevalent on this coast. Masters of vessels should be guided by the signals and by the semaphore arm on flagstaff, as a strong current is sometimes felt across the entrance and on the bar, especially with a westerly sea or swell. During the day at tide time a red flag is shown on the leading beacon, which kept in a line with the flagstaff leads over the bar in the deepest water; when the river is fairly entered two triangular-shaped white beacons bearing S.E. will be seen, which lead up river in the deepest water to the Stone Groin (where the front beacon stands) one and one-tenth miles inside the bar. During the night at tide-time a red light is shown on the leading beacon, which kept on with the bright light on the flagstaff (the harbour light) leads over the bar, when two red lights on the beacons within will be seen bearing about south-east. Before reaching the Groin two green lights will be seen bearing south-east by south-southerly, which lead up river to the upper wharf, on which the front beacon is placed, surmounted by a circle, the back beacon by a triangle, both painted white; they mark the channel by day, leading up river from mid-channel, off the S.W. end of Stone Groin. The Buller is subject to heavy floods which generally occur between October and February inclusive; only steamers with good power should attempt entering during those periods; the force of current is met about a mile inside the bar, increasing as the river is ascended. A red flag is shown at the flagstaff in addition to the balls during thick or dirty weather, when the bar is considered safe. The roadstead is open to all winds between N.N.E. and S.W. (west about). The holding ground is good at the anchorage, *i.e.*, with the flagstaff bearing from south-east by east to south south-east. Masters can choose their own depth according to circumstances, but for riding out a S.W. gale (which is sometimes done) the depth should not exceed ten fathoms. Anchoring in the

south-western portion of the roadstead near the Steeples is not recommended, as the holding-ground is bad. The flagstaff should be kept in sight in case it might be necessary to communicate with vessels at any time. Sailing vessels should not hang on too long with the wind from seaward, and should get under weigh if possible on the ebb, as the flood tide sets on the Steeples. It is H. W. F. and C. on the bar at 10h. 25m. ; springs rise nine feet six inches ; neaps five feet six inches. The average depth last year on the bar was nearly thirteen feet at high water springs ; at neaps nearly eleven feet ; the maximum is about fourteen feet at springs, and twelve feet at neaps. With suitable vessels the bar is worked without difficulty in favourable weather during the night. The bar changes with floods and westerly gales, the former sending it straight out to the north-west, the latter causing it to trend northward as far as N.N.W. $\frac{1}{2}$ N. During those changes the depth is not much altered ; as a rule it is deeper after a flood, provided it has not been too heavy."

The valley of the Buller forms an extensive gap between the high mountains which bound it, running in a south-easterly direction several miles, and is remarkable from seaward. These snowy ranges extend parallel with the coast three to four leagues nearly to Cape Farewell.

From the Buller River the coast, low and wooded, fronted by a narrow sandy beach, and intersected by small streams, trends north-east and N.N.E. 23 miles ; nearly in the depth of the bight, the beach is succeeded by a remarkable line of cliffs, which extend 12 miles, with two conspicuous white bluffs, visible a long distance from seaward, near their northern extreme.

"Ngakawa (chart Nga-kuhu) River is 18 miles north-eastward of the Buller, with 7 to 10 feet on its bar at high water spring tides ; the rise of tide and time of high water being the same as at Westport. Leading beacons, painted white, mark the channel over the bar, and are surmounted by red flags, when it is safe to enter. The river is navigable for vessels of light draught for only three-quarters of a mile from its mouth. Here a coal seam of good quality crops out on the south bank. The bar is sheltered from southerly winds by Cape Foulwind, but is exposed to all winds from S.W. to N.N.W. Owing to the flatness of the beach, the sea breaks a long way out in bad weather."—Wellington Almanac, 1879.

A railroad is now open for traffic between Westport and Ngakawa, 18 $\frac{2}{3}$ miles long.

Wanganui River is 2 $\frac{1}{2}$ miles northward of the bluffs, at the commencement of a sandy beach, which runs in a straight line 14 miles N.N.W. $\frac{1}{4}$ W., with three small rivers, Mahana, Karamea, and Parara, near its central part, and a fourth, the Kollahai, at its northern extreme ; near which the cliffs again occur, and the coast trends N. by W. $\frac{3}{4}$ W., 11 miles to Rocks Point, indented by small sandy bays with rocky projections between.

"Mokihinui River, 22 miles N.E. by N. $\frac{3}{4}$ N. from the Buller ; has 10 to 12 feet on the bar at high water springs. Rise and time of high water the same as Westport ; it is exposed to winds from S.W. to N.N.W. There is a coal mine a short distance up it.

"Karamea River, 35 miles N. by E. $\frac{3}{4}$ E. of the Buller, has 10 to 12 feet on its bar at high water springs ; the rise and time of high water being about the same as Westport. There is no signal station here. With S.W. and westerly winds there is a heavy sea, which breaks a long way off, owing to the flatness of the beach.

"The entrance of Wanganui River is well marked by the northern extremity of the high land which forms its south head, as also by the white bluffs. The bar, exceedingly well sheltered from the S.W. by a long reef which extends from the south head westward, is straight, with 11 to 13 feet on it at high water springs. The south side of the river, straight and rock-bound, runs E.S.E. about $\frac{1}{4}$ of a mile, then trends N.E. and northerly. The north side is a sandy beach. The river is navigable two miles from the entrance for vessels drawing six feet. Shelter can be obtained inside during floods for small vessels. There are no signal stations at either of these rivers."—Wellington Almanac, 1879.

Heaphy, or Wakapoua River, whose entrance between two high bluffs sloping to the sea is remarkable, lies 4 $\frac{1}{2}$ miles south of Rocks Point.

SOUNDINGS.—The depth across the entrance of this bight, from Cape Foulwind to abreast the white bluffs, is 30 to 40 fathoms; it then deepens; five miles off the clifly shore, between Kollahai River and Rocks Point, there are no soundings at 50 to 60 fathoms.

Rocks Point, with numerous scattered rocks extending half a mile off shore in its neighbourhood, is a bold projection; hence the coast rounds away N.N.E. towards Cape Farewell, 37 miles.

Kiourangi Point, with a reef extending from it a short distance south-west, is 11 miles N.N.E. of Rocks Point, with on its northern face a remarkable white stripe, a good sea-mark, visible a long distance.

A dangerous rocky shoal (see small plan) extending $\frac{3}{4}$ of a mile parallel with the coast, and $\frac{1}{2}$ a mile wide, with $3\frac{1}{2}$ fathoms on its shoalest part near the southern end at low water, lies with its S.W. extreme N.W. by N. $4\frac{1}{2}$ miles from Kiourangi Point, and the same distance off the coast abreast, with deep water round it. In heavy weather the sea breaks heavily for a considerable distance. (See footnote below—Stewart Breakers.)

A sandy beach now extends northward 13 miles, with occasional clifly projections. Towards its north-east extreme is a white patch of sand, just within high-water mark. A shoal bank extends half a mile off its southern end. The entrance of Wanganui Inlet is eight miles north-eastward, with clifly points intervening.

Stewart Breaker.—A sunken rock has been reported, lying eight miles off nearly midway between Cape Farewell and Rocks Point. It was seen breaking heavily, after a south-west gale. The following bearings were taken near the breakers:—Cape Farewell high land N.E. by E., Rocks Point South. The remarkable landslip north of Kiourangi Point S.S.E. This position, from which breakers extended S.W. $2\frac{1}{2}$ miles, places the danger approximately in $40^{\circ} 39' S.$, and $172^{\circ} 13' W.$ *

Wanganui Inlet.—The entrance shows distinctly from seaward. The points are high, sloping gradually to the sea, with higher land behind. The south head, after sloping, rises again in a cone from the water's edge, as a yellowish clifly projection. Mount Burnett, or Knuckle Hill, with its double summit, bears E.S.E. six miles from the entrance.

The bar stretches across from the heads. It has six feet at low water, and may be crossed at high water by vessels drawing 10 to 12 feet. The deepest channel is close along the southern shore. When inside the water deepens to three and four fathoms. The inlet runs S.W. by S. little over one mile, then separates into two arms, north-east and south-west, or parallel with the coast. The north-east arm almost dries at low water. Anchorage in four fathoms one mile within the entrance close on the southern shore. To enter, moderate weather and a leading wind is necessary. South-west winds blow down the southern arm, and generally right out of the harbour.

The bar has not been closely examined, but vessels of the above draught have crossed it.

The Coast to Cape Farewell from Wanganui Inlet trends N.E. $\frac{1}{2}$ N. eight miles.

Curious Cliff, $3\frac{1}{2}$ miles south-westward from Cape Farewell, is a remarkable piece of table land, its northern end having fallen away. Close in-shore off it is a small perforated rock, Archway Islet. Several scattered rocks lie off the adjacent coast.

From southward, the land about Cape Farewell has a hummocky appearance, of moderate height, the extreme falling down in broken cliffs, where it joins Farewell Spit. At the proper navigating distance, three miles off, the soundings are 36 to 40 fathoms.

When Cape Farewell bears south three miles, an E. by N. $\frac{1}{2}$ N. course

* This position is about 6 miles N. $\frac{1}{2}$ W. of the place where the Stewart Breakers are laid down in the Admiralty Chart, Sheet VII., corrected to 1876, which latter position is that given of the Kiourangi Shoal (see above) by Captain Johnson. Stewart Breakers (chart) and Kiourangi Shoal (Johnson) are therefore identical: but as the cross bearings given in the text ("New Zealand Pilot," 1875) seem to indicate accurate observation, and, as no "Gazette" notice to mariners can be found on the subject, it is obvious that caution will have to be exercised when in this neighbourhood.

leads nearly four miles outside Farewell Spit, in 29 to 34 fathoms, fine gray sand; the high sand mound, near the centre of the spit, will be seen in passing at this distance, as also the lighthouse, and from aloft, the bushes on its eastern high-water extreme.

South-west winds on this part of the coast generally veer westward, and draw into Cook Strait after passing Cape Farewell.

For clearing the end of Farewell Spit see pp. 122-3. On the outer coast of Cape Farewell it is H. W. F. & C. at 9h. 0m.; the flood stream commences at 6h. 0m., and runs south-west, parallel with the coast as far as Wanganui Inlet at from $\frac{1}{2}$ to two knots.

OUTLYING ISLANDS SOUTH AND EAST OF NEW ZEALAND, VIZ., AUCKLAND, CAMPBELL, ANTIPODES, BOUNTY, AND THE CHATHAM ISLANDS.

AUCKLAND ISLANDS.

VARIATION IN 1875.

Auckland Islands - 17° 40' East | Chatham Islands - 15° 0' East.

The Auckland Islands, southward of New Zealand, lie between 50° 30' and 51° S., and 165° 55' and 166° 15' E., consist of one large and several smaller islands, separated by narrow channels, and extend 30 miles north and south, by nearly 15 miles in breadth. Their height ranges from 950 feet at Hooker Hills in the north to 2,000 feet at Adams Island on the south. The east side of the main island is deeply indented, but the western side is unbroken, having no opening but the narrow channel between it and Adams Island, fit only for small steam vessels, the coast line backed by hills from 600 to 1,500 feet high.*

Depôts of provisions have been established by the Colonial Government for the benefit of ship-wrecked people at the following places: south side of Erebus Cove; sandy bay on Enderby Island; Saddle or Norman Inlet; and at Carnley Harbour.

Abundance of fish, mostly rock cod, may be caught by hook and line from the shore, generally in places where there is seaweed. There is a large bed of cockles at the head of Laurie Harbour (Port Ross), the shells of which are from $1\frac{1}{2}$ to 2 inches in diameter. They are about two inches below the surface at low water. Rabbits and a number of cattle were on Enderby Island when visited by H.M.S. Cossack in 1873.

The climate, though boisterous and subject to much rain, is healthy. The temperature is equable, the snow never lying more than three days on the ground, except on the summit of the hills.

The winds are violent and of long duration; the gales are mostly from the north-west, but sometimes from the eastward, and unusually strong. They commence at North with a falling barometer, veer gradually to West and W.S.W., and at times blow most violently; when the barometer begins to rise the gale ceases at South or S.S.E.

The whaling season is in April and May.

Bristow Rock is an off-lying danger northward of Enderby Island directly in the track of vessels rounding the north end of the group, on which the sea sometimes breaks violently, with probably not over five or six feet water on it. The position given by H.M.S. Fantome in 1852 is:—From the north-east end of Auckland Island the rock bore N. by E.—Mount Eden being also in line—from the highest part or centre of Enderby Island N. by W. $\frac{1}{4}$ W.; and from the north-east point of Enderby Island N.N.W. $\frac{1}{2}$ W., which would place it about $3\frac{1}{2}$ miles from Enderby Island, a position which was only considered approximate.

H.M.S. Cossack, in 1873, from two different sets of bearings, places the rock a little over $2\frac{1}{2}$ miles from the north extreme of Enderby Island, and for the present this position is given on the chart; but three days afterwards

The excellent description of these islands given in the "New Zealand Pilot," is of necessity left out.

the Cossack steamed along the north shore of the island, at a distance of about $1\frac{1}{2}$ miles between it and the rock, when nothing was seen of it, which fully accounts for its not being seen by several other ships; it is therefore necessary to exercise great caution in this locality.

The tide rips off the north point of Enderby Island extend at times to a distance of 12 miles to the N.E., and to a stranger have an alarming appearance. The flood sets N.N.E., the ebb to the southward.

North-west Cape is a remarkable bold high headland, with a rocky islet and a conical rock off it; eastward of the cape is a dark looking promontory, Black Head.

The West Coast is one continuous perpendicular wall from 200 to 800 feet high.

DISAPPOINTMENT ISLAND, small in extent, high, rocky, and inaccessible, with its outlying rocks, lies off the middle of a bight two miles from shore, and appears from the northward like three sugar loaf mountains. A strong current sets between the islands and the main; the passage—with 40 fathoms in it—is unsafe even in fine weather.

Port Ross*, at the north-eastern end of the group, between Enderby and Ewing Islands, is one mile wide and runs nearly seven miles to the south-westward, narrowing to a third of a mile at its head, with from 20 fathoms water at the entrance to $3\frac{1}{2}$ fathoms at its inner part. Its shores are indented with several bays.

Enderby Island, the north-eastern of the group, is $2\frac{1}{2}$ miles east and west, of no great elevation, and well supplied with water. Between it and the main coast is Rose Island, separated by narrow boat channels, through which the tide sets strongly, the sea occasionally breaking right across. Sandy Bay, on the south side of Enderby Island, $1\frac{3}{4}$ miles from its east extreme, is a temporary anchorage, protected from all winds except those from the south-eastward; holding ground is tenacious clay.

DEAS HEAD, three-quarters of a mile S.W. of Rose Island, is formed of basaltic columns 300 feet high, which are highly magnetic.

TERROR COVE is three-quarters of a mile southward of Deas Head. Erebus Cove is south of Terror Cove, separated by a projecting point. On its southern shore the beach is good for landing, the shore level and suitable for wharfage, etc. Vessels may lie in these coves nearly land-locked. Water and wood are in abundance: winged game, etc., plentiful.

TIDES.—It is H.W., F. and C., in Terror Cove at 12h.; springs rise about three feet, with an irregular movement near high water for about an hour.

SHOE ISLAND, in the middle of the harbour, off Terror Cove, is a cable in length, bold, highly magnetic, and steep-to.

LAURIE HARBOUR, at the head of Port Ross, is two miles long W.S.W. and E.N.E., with an average breadth of four cables. Shallow water and weeds extend eastward a long quarter of a mile from the point which separates the harbour from Erebus Cove, to which a berth should be given. It is entirely landlocked; there is a large stream at its head; the land birds are excellent eating, especially the hawks.

DUNDAS AND GREEN ISLETS, two small islets $1\frac{1}{2}$ miles apart, connected by a reef, lie $1\frac{1}{2}$ miles south-east of Ewing Island on the south side of entrance to Port Ross. The reef, covered in part at high water, generally shows by the breakers which extend a mile north-eastward of the low outer islet. This danger should be carefully avoided, as in thick weather a vessel might be in the breakers without seeing the land.

ADAMS ISLAND, the southernmost of the Auckland group, 2,000 feet high, faces the south end of Auckland or main Island, forming between a channel the breadth of the islands, called Adams Strait or Carnley Harbour. Its western entrance is very narrow, not over 100 yards wide, with a rocky ridge of $3\frac{1}{2}$ fathoms (at half ebb) across it, deepening suddenly seaward to 13 fathoms, causing a dangerous rip, inside the water is smooth, it is only fit for small steamers; there is a large whirlpool in the narrowest part.

NORTH ARM AND MUSGRAVE HARBOUR.—The eastern entrance to Adams

* See plan on Admiralty Chart, No. 1114.

Strait, five miles N.E. of South Cape of Adams Island, is formed by two bluff points; thence the strait runs westward four miles to the entrance of an irregular inlet which continues northward and north-west to Musgrave Harbour, and to the North Arm; the latter, a fine basin with room for several vessels, its head about five miles from mouth of inlet. The water in the strait and inlet is deep, but with anchorage in the harbours in four fathoms clay. In bad weather the wind comes down over the high land in severe squalls and whirlwinds, dangerous for boats under sail.

Musgrave Inlet, on the east side of Auckland Island, is five miles deep westward and W.S.W. to its head. Its entrance is on the north side of a point, with a large black flat rock off it, 10 feet above water. Under the round bluff head, on the south side, is a nine-fathom patch marked by kelp, two miles within a bank runs straight across the inlet with six fathoms within 50 yards of the south side, increasing to eight fathoms the same distance from the north side, marked by kelp; at the head of the inlet is anchorage in 12 to 7 fathoms, landlocked, the breadth across being two cables.

Hanfield Inlet, south-west of Musgrave Inlet, has two arms; it is open to the north-east, but the wind rarely blows from this quarter. There is a magnificent waterfall in the southern arm.

Smith Harbour, north of Musgrave Inlet, runs westward and then southward, forming a good harbour for a steamer or small vessel, landlocked and safe, with from nine to three fathoms. A fine stream of water runs into it.

Northward of Smith Harbour are Norman, Griffith, Granger, and Chambres Inlets, all more or less open to the eastward.

CAMPBELL ISLAND.

VARIATION IN 1874.

18° 35' East.

Campbell Island is 30 miles round, mountainous, and has several good harbours.

Perseverance Harbour.*—The entrance is half a mile wide, it runs westward three miles, then south-westward to its head. The shores are steep and rise abruptly to 800 and 900 feet. Lyall Hill, on its north side, is 1,500 feet high. Sudden and violent rushes of wind is a characteristic phenomenon of all the islands about this latitude. The inner part of this harbour is completely landlocked, with room for a large number of ships. The shores are free from danger excepting Shoal Point, on the south shore, at the turn to the inner part of the harbour. Water is abundant. Geese and duck were seen at the head of the harbour, but no pigs, in 1874.

Shoal Point is in lat. 42° 33' 26" S., long. 169° 8' 41" east.

TIDES.—It is H. W. F. & C. in Perseverance Harbour at 12h.; springs rise 3½ feet.

Off the west side of the island are three large rocks, the north-west one is 300 feet high; close to it, southward, is another 200 feet, much smaller; the two other high rocks are each about 300 feet high. Off the south-west point of the island is a larger rock or islet 600 feet high; inside these are a number of smaller rocks, one very conspicuous north-westward of south-west islet, resembling a cloaked figure on a pedestal. Monument Harbour is an indentation in the land near it; no outlying dangers were seen from two miles off them.

The south part of the island is much higher than the north; the south-west point is high, ending in a bluff 300 feet high, with an islet off it. North of Erebus Point half a mile is a dark perpendicular bluff, 300 feet high, the easternmost point of the island. Hence the land falls back to the north-east point, with a conspicuous rock off it. The north point is perpendicular, 400 feet high.

* See Admiralty plan:—South of Perseverance Harbour; and sketch of Campbell Island on sheet No. 1,114. "The position of Observatory Point, Perseverance Harbour, is 169° 11' E. by chart 1114; chart 788 places it 10 miles too far East."—H.M.S. Nymphe, 1878.

There is a depôt of provisions in Perseverance Harbour, the position of which is marked by a white staff.

North Harbour or Penguin Bay is on the east side of Campbell Island, with Cossack Rock, a small round island, off the north point of entrance. It extends westward three miles, increasing in width towards the head, terminating in two creeks. At the head of the bay is a considerable stream of water. Penguin Bay is easier of access than Port Perseverance. Easterly winds seldom blow there. Anchorage in all parts of the bay in $5\frac{1}{2}$ to $8\frac{1}{2}$ fathoms.

The bays on the west side (Boat and Monument Harbours of the plan) afford no shelter.

ANTIPODES ISLANDS.

Variation in 1875.

$17^{\circ} 25'$ East.

Antipodes Islands, an isolated group of several rocky islands, extend north and south four or five miles, are placed in (largest island 1,000 feet high) $49^{\circ} 42'$ S., $178^{\circ} 43'$ E. Sixty fathoms were found half a cable off its eastern shore. Landing appears impracticable.

BOUNTY ISLANDS.

Variation in 1875.

$17^{\circ} 0'$ E.

Bounty Islands, a small cluster of rocky islets, variously stated at from thirteen to twenty-four in number, cover a space $3\frac{1}{2}$ miles east and west, by $1\frac{1}{2}$ north and south. The western, the largest, covers about 8 or 10 acres, and may be seen 20 miles. Ten miles south of the eastern islet are 75 fathoms fine white sand; 18 miles E.S.E. of this position, 104 fathoms, fine brimstone coloured sand; $2\frac{1}{2}$ miles N.N.W. of the group are 83 fathoms, sand and shells; 8 miles off 95 fathoms, fine sand of brimstone colour.

CAUTION.—Sunken rocks southward of the group bear from its western extreme S. $\frac{1}{2}$ W., from the eastern extreme S.W. $\frac{1}{2}$ S., distant $3\frac{1}{2}$ miles, or 2 eight-tenths miles off shore, are exceedingly dangerous; great care should be taken approaching in thick weather, as they sometimes do not break for five or ten minutes.

The eastern islet, which is one of the highest, is 280 feet high. Lat. $47^{\circ} 46'$ S., long. $178^{\circ} 56' 44''$ E.

CHATHAM ISLANDS,

Variation in 1875.

Point Munnings, $15^{\circ} 0'$ E.

Between the parallels of $43^{\circ} 25'$ and $44^{\circ} 20'$ S., and the meridians of $176^{\circ} 10'$ and $177^{\circ} 15'$ W., 365 miles eastward of Cape Palliser, Cook Strait, New Zealand, consists of three islands—the largest, Chatham Island (*Ware Kauri*); Pitt Island (*Rangi-haute*); the third and smallest, Rangatira; and several detached small islets and rocks.*

Chatham Island (Ware Kauri) is of irregular formation, nearly the form of a horseshoe, extending W.S.W. and E.N.E. about 38 miles, and from north to south 25 miles, with its coast line deeply indented by large bays. The land in the northern part is said to be highly productive, equally fit for grain or cattle. Here are also several lakes with sloping hills, usually one to two miles round. There are some also on the west coast. The largest, at the head of Waitangi Bay, is six miles round.

*Admiralty Chart, No. 1,417, Chatham Islands, Waitangi, Hutt, and Kangaroo Ports.

The Coast.—Waitangi or Petre Bay, on the south-west side of the island, is 13 miles wide between the points, whence the coast falls back 10 miles in a semicircular form. The land is undulating, of small elevation, rising to the north-west into detached hills. Except the Waka-kaiwa, two hillocks at the south-west point of the island, no hills are visible in that direction. The land rises gradually from the rocky shore, the top a level or undulating surface.

The northern point of Port Waitangi is a red bluff. Three miles northward is another similar bluff, with a sandy beach backed by low hills between. From the northern bluff the beach is again sandy for some miles, then rocky to the north-west point of the island, indented by four small bays, open to the south-eastward.

The north side of the island forms several wide open bays. Westward the shore is flat, the headlands running out in long wooded tongues of land. Ten miles from the north-west point is a group of irregular hills. Maungani terminates in a rocky precipice, from the foot of which runs out a spit with a level beach, which forms the western termination of a bay with a sandy beach, whose eastern boundary, 10 miles distant, is a hilly promontory. In the middle of this bay four needle-shaped rocks lie about a cable off shore.

Eastward of the promontory (Cape Young) the shore runs 15 miles eastward, with a broad beach and rocks along the shore, uncovered at low water. Kangaroo or Skirmish Bay is near the east end of the island, with rocks—sunken and above water—off its points, and partly obstructing its entrance. Lure Reef lies half a mile northward of its west point.

The E. end of the island is rocky. Reefs extend a long way eastward from Wakuru Islet, which is connected to the main rocks. From the islet the east coast trends southward, and forms a bay two miles long, with a sandy beach. Rocks, visible at low water, lie scattered along shore. With easterly winds heavy breakers extend several miles off. The southern point of this bay is rocky, thence a long deep bay extends to the south-east end of the island, which is a hilly promontory covered with wood, off which rocks extend nearly two miles north-eastward.

The anchorages on this side of the island are about six miles from the north-east extremity, where a boat can land at all times; and near the south-east extreme. Easterly winds often set in suddenly.

The southern coast is abrupt and precipitous, with a level summit.

Mata-Ketaki or Mount Paterson is the westernmost of a chain of hills of pyramidal and irregular shape, not over 800 feet high, at the N. W. end of the island; their extreme end forms a perpendicular cliff 100 feet high, but separated from the sea by a flat beach $1\frac{1}{2}$ or 2 miles in breadth.

Near the head of Wangaroo or Port Hutt is a small hill, called Emokawa or Iwa-kawa, three miles from which is Mount Dieffenbach, the most regular and apparently the highest pyramid. Ware-Kauri rises two miles from the northern shore, and 15 from the west end of the island.

Rangi-Tutahi or Sisters (placed on the chart about 14 miles northward of Point Alison, and 11 miles north-westward of Cape Young) are two small rocky flat-topped islands near each other, 100 feet high. A line of breakers runs off about five miles to the North-West Reef.

The following is from the description by Capt. C. W. Hope, H.M.S. Brisk, 1865; he describes the chart of these islands as imperfect and erroneous, especially as regards the southern portion.*

Cuba Channel.—The coast from Alison to Somes Points appears fringed with rock, and should not be approached within one mile. The break on West Reef is seen eight or ten miles from the mast head; when nearer patches of the reef are visible. The reef seems to be correctly placed on the chart, but to extend farther north-west from the dry part than laid down. The channel is three miles wide between the reef and Somes Point, through which at half speed no bottom was found, with 10 fathoms, and no indications of dangers.

Petre Bay.—The only anchorages recommended in Petre Bay are

* See Admiralty chart of the Chatham Islands, No. 1,417.

Wangaroa or Port Hutt, and Port Waitangi. Nothing was seen of the Heaphy Shoal; it was stated that it had no existence. There was a heavy swell running, but no appearance of any break off this shore, except on the Jenny Reef.

WANGAROA or PORT HUTT is sheltered from all winds, but very confined, and as with strong west and south-west winds there is a heavy sea at the entrance, a vessel should anchor as far in as possible. The entrance may be easily recognised by the view on the chart.* When the hummock on Mount Iwa-Kawa opens eastward of Maunganui (as in sketch) the harbour is open, and the white beach at its head will be seen. There are likewise sandy beaches at the head of the two bays eastward of Wangaroa, therefore care must be taken not to mistake between them.

The break on the rocks on either side of the entrance marks the dangers; keep midway between and steer straight in N.W. by W. A patch of kelp stretches partly across the entrance from Napper Reef; there is deep water where it lies, the Brisk passed through it. The reef off Gordon Point must be avoided; the outer edge of the kelp there marks the deep water.

The Brisk anchored inside Gordon and Evans Points in five fathoms, coarse sand and shells, with the centre of the little cove behind Evans Point bearing N.E. A large vessel should moor if intending to stay any time.

TIDE.—It is H. W. F. & C. at Port Hutt at 6h. 50m.; rise, 6 feet.

WATER.—A stream of excellent water at the north-west corner of the harbour.

Port Waitangi is the principal place in the Chatham Islands. The Resident Magistrate lives here. Fresh meat, poultry, vegetables, and potatoes may be obtained in abundance. The lakes abound with wild ducks; there are curlew, plover, and pigeons, with abundance of wild pigs.

The anchorage at Port Waitangi is not safe for large vessels during westerly gales. Vessels drawing not over 12 or 13 feet may ride out south-west gales by anchoring close in, with Hanson Point bearing S.W. or S.W. by W., in a measure sheltered from the heavy sea, but a rolling swell will try their cables.

With a gale from north-west this is decidedly a dangerous anchorage. A shoal with five fathoms on it is said to lie $1\frac{1}{2}$ miles northward of the anchorage; the exact spot is uncertain. It is known to the natives, who go there to fish.

The Coast south-eastward from Durham Point to Evêque Point, is high, bold, and apparently clear of danger. Evêque Point has a remarkable hill with a cleft rock on the top like a bishop's mitre.

Pitt Strait.—The Brisk passed about $1\frac{1}{2}$ miles northward of the Sentry Reef, which appears correctly placed, but smaller than laid down on the chart. It is under water, but the sea breaks violently on it.

There is said to be a rock some little distance off shore, two or three miles westward of Cape Fournier, but out of the ordinary track of vessels passing through Pitt Strait, nothing was seen of it. With the exception of this rock and Sentry Reef, Pitt Strait is stated to be free from danger. The rocks off the west and south-west sides of Pitt Island are high and steep.

Pitt Island and its surrounding islets and rocks are most incorrectly laid down on the chart; with the exception of Sentry Reef, the entire chart south of Capes Evêque and Fournier is erroneous. The north end of Pitt Island bears S.E. by S., 9 miles from Cape Fournier.†

The north end of the island forms a bay $1\frac{1}{2}$ miles wide and half a mile deep, with good anchorage in southerly winds. From the centre of this bay Evêque Point bore W. $\frac{3}{4}$ N. and Cape Fournier N.W. by N.; assuming these two capes to be correctly laid down, this part of the bay would be in $44^{\circ} 13' S.$, $172^{\circ} 29' W.$, which agreed with the observations at noon. (Note on Imray's chart 1878: "Surveyed by Mr. S. P. Smith of the N. Z. Survey Department, 1858. A few reefs have been added from the Admiralty chart 1417. There has not been a hydrographical survey of the islands. The long depends upon Gordon Point, Wangaroa being in $176^{\circ} 39' 50'' W.$, as deter-

* See Plan of Port Hutt, and view on Chart, No. 1,417.

† Captain C. W. Hope, H.M.S. Brisk, 1867.

mined by the U.S. transit of Venus party in December, 1874." This chart places the above position of the bay in $44^{\circ} 14' S.$ and $176^{\circ} 12' W.$)

On the east side of Pitt Island is an anchorage much frequented by whalers, where vessels may ride well sheltered from westerly gales; on the west side there is good anchorage with northerly and easterly winds in a bay behind a high precipitous island called the "Castle,"—probably The Fort of the present chart—it occupies more nearly the position of The Outposts Islets as now laid down; this latter, a remarkable sharp-pointed rock, is further to the S.W.; and the extreme rock of this group—the Sail Rock—lies considerably south-west of its position on the chart. This group of rocks is very remarkable: the "Castle" is flat-topped with perpendicular precipitous sides, 300 or 400 feet high.

SUPPLIES.—Abundance of fresh meat, potatoes, and vegetables may be obtained at Pitt Island, also poultry, milk, and butter.

Bertier Rock.—On leaving the north end of Pitt Island, the Brisk steered N.N.E., which took her four or five miles northward of Bertier Rock (? Motuhara), a flat-topped islet about 150 feet high. It lies about E.N.E. 16 miles from Cape Fournier, and is nearly on the parallel of $44^{\circ} S.$

Round Island bears E. by N. $\frac{1}{2}$ N. seven miles from north extreme of Pitt Island.

Three Rocks.—The existence of the three rocks laid down in lat. $44^{\circ} 20' S.$, long. $176^{\circ} 3' W.$ (query this position), is considered doubtful; their present position on the chart places them E.S.E. 26 miles from Cape Fournier, the S.E. point of Chatham Island. The position of the Star Quay Reef is also doubtful. Three remarkable rocks which run S.W. and N.E. lie westward of the south point of Pitt Island, a round rock like a bell lies four miles S. $11' E.$ from south point of Pitt Island, and E. $42' S.$ from Point Evêque. Four miles N. $32' E.$ from Bell Rock is a danger nearly awash, on which the sea breaks. Eighteen miles east from Bell Rock are three rocks, position doubtful. Eighteen miles E. $29' N.$ from Bell Rock is Star Quay Reef, position also doubtful. Captain Hope says they occupy quite a different position. Twelve miles N. $28' E.$ from Bell Rock is Round Islet (Captain Hope says this is four miles too far to N.W.). There are some dangers between Round Islet and the point, but possibly a passage between. There are many small sunken rocks south of Pitt Island, and four above water. They are not over $2\frac{1}{2}$ miles from the island.

Rangitira—S.E. island, 678 feet high—lies two miles eastward of the southern end of Pitt Island, with the Passage Rock between.

The South Pacific Pilot.

ISLANDS BETWEEN LATITUDE 20° AND 40° S.

The following description of the Islands is mainly from Findlay, supplemented by latest available information:—

Rapa or Oparo, Rapa-iti or Little Rapa, when first seen to the north-east appears as three small islands. Its greatest extent N. 18° W. and S. 18° E. is about 6½ miles, and it may be 18 or 20 miles in circuit.

Its principal character is a cluster of high craggy mountains, forming, in several places, remarkable pinnacles, with perpendicular cliffs nearly from their summits to the sea.

It is of very irregular form, with several indentations in the coast, two of which are considerable bays; the third and largest is the harbour, Ahurei. The coast is bold, with no outlying reefs beyond half a mile.

Captain V. Hall ascertained the height of the most remarkable peak in sight from the harbour to be 2,100 feet.

Ahurei Harbour, on the eastern side of the island, is very snug. The land rises on three sides like the wall of an amphitheatre; it is protected by the reefs and a beacon islet on the fourth or eastern side. Near the anchorage was a small village. Further off, on the opposite side, was a large village, the capital, where the king and the French resident live. The exit is inconvenient, by reason of the easterly, which are the prevailing winds. The harbour lies nearly east and west. The roadstead is deep; the bottom coral, covered by a thin layer of mud. The squalls from the mountains are very violent, anchors and chains exposed to constant beating and friction, are very liable to break. There is little danger of dragging, as the bay is well defended by the reefs at the entrance.

The entrance channel—tortuous through the projecting reefs—requires buoying. Inside there is room for twenty ships to moor safely. The tide rises 2 feet 6 inches. It is H. W. F. & C. at 12h. 15m. Ahurei Harbour is in 27° 36' S., 144° 15' W.

“There is a fine extensive harbour on the south-west side of Oparo, almost landlocked. Anchorage in 8 fathoms. Trade copra and pigs.”—Captain Murray.

There is a remarkable absence of surf, not easily accounted for. Landing is easy anywhere, and boats can lie alongside precipitous cliffs exposed to a swell which rolls in unchecked for thousands of miles without breaking.

The winds, from October to April, are from south-east to north-east, and westerly at times the remaining part. Destructive hurricanes are sometimes experienced.

Goats abound. Small vessels occasionally take a cargo of them to Tahiti.

The tara-root grows abundantly. Coal of a very inferior quality has been found; the natives use it occasionally for cooking; it is useless for steam purposes. There are no cocoanut trees.

Neilson (or Lancaster) Reef extends a considerable distance, curving S.E. in the form of a crescent, as far as the eye could reach from the mast-head; it only breaks occasionally. It is placed in 27° 0' S., 146° 16' 45" W. The least depth found is only 12 feet.

Bass Isles, four small islands, lie 46 miles S.E. of Rapa, whence they are visible in fine weather; the S.E. rock, the highest of the group, is 346 feet high, and considered to be in 27° 55' 30" S., 143° 28' 20" W.*

* Several reefs and groups of islands have been announced as lying on a parallel to the southward of these islands; but as there is very little to support the assertion, it will be only necessary to mention them in this note.

A group of islands, in 31° 6' S., 127° 24' W., from whaler report.

Mitchell Group, in lat. 31° 20' S., long. 129° 30' W.

TUBUAI ARCHIPELAGO,

a dispersed group, lying southward of the Society Islands and Low Archipelago.

Vavitao, the easternmost, a small, high island, is placed in $23^{\circ} 40' S.$, $148^{\circ} 0' W.$ by M. Maurue. He says it is high, and surrounded by reefs. There is a well-sheltered harbour in its N.W. part to the west. The current here is so strong that it cannot be outrun in light breezes.

Tubuai, the next island westward, is smaller than Vavitao, and not over five miles in extent. From the northward it appears like two islands, but the hills join at the base; steer for the ridge between them, and it leads to the passage through the reefs to the anchorage inside, which is unsafe, and fit only for small vessels; the anchorage outside is insecure and rocky, with bad holding ground. A reef extends a full mile off the S.W. point.

The French flagstaff is on the north side of the island, about the middle, $23^{\circ} 21' 45'' S.$, $149^{\circ} 35' 35'' W.$ The anchorage is with the flagstaff S. $\frac{1}{2}$ E., true, about $1\frac{1}{2}$ mile distant, and is very bad, coral bottom, so that if you drive you lose your anchors. There are pilots—it would be imprudent to enter without one.

Rurutu, or Oheteroah, is about 13 miles in circuit, 1,300 feet high, volcanic in appearance, having two small peaks, and higher in the centre, with uneven outline, and is four (or seven) miles from east to west, with a bold appearance. The south extreme is a shelving point, with breakers running off it, the northern side runs off in several low points westward $22^{\circ} 29' S.$, $151^{\circ} 20' 23'' W.$ was found to be correct by Commodore Powell, R.N., in the *Tapaze*, 1867.*

There is a narrow passage through the reef at the N.E. end, where vessels 40 to 50 tons can enter, but is so small that checking lines from the natives on the reef are necessary; it is seldom used. The natives export cotton, cocoa-nut oil, copra, sponge, and arrowroot. Supplies of pigs, fowls, water, vegetables and fruit in limited quantities can be obtained.

Rimitera, about 300 feet high in the centre, and two or three miles from point to point. It has no harbour, but the same supplies as the others. Its position is given as $22^{\circ} 40' S.$, $152^{\circ} 59' 49'' W.$, or $152^{\circ} 52' W.$ The natives are said to build boats of from 20 to 50 tons, and export cotton. There is no passage through the reef, but the village on the east and that on the west side are accessible, not so the village at the south end.

Hull, Maria, or Sands Islands, a group of four small islands. The reef is triangular in form, with its longest side lying N.W. and S.E., along which are three islands in a distance of about three miles, the fourth at the apex of the triangle, two miles N.E. of the centre one. The N.W. corner is placed in $21^{\circ} 49' S.$, $154^{\circ} 51' W.$ Landing impracticable, owing to surf.

COOK'S ISLANDS.

Mangaia, or Mangepa the south-easternmost of the group, is placed in $21^{\circ} 47' S.$, $158^{\circ} 7' W.$, and also $21^{\circ} 49' S.$, $157^{\circ} 56' W.$

It is about 700 feet high, and 30 miles in circuit. At a distance it

* An island, from whaler report, in lat. $31^{\circ} 0' S.$, long. $155^{\circ} W.$

A reef, announced in the "San Francisco Herald," in lat. $30^{\circ} 48' S.$, long. $161^{\circ} 17' W.$

An island, from various whalers' reports, between lats. $29^{\circ} 34' S.$ and $30^{\circ} 10' S.$, and longs. $143^{\circ} 0' W.$ to $144^{\circ} 24' W.$, may refer to Bass Islands, or it is barely possible, though not probable, that another island may exist in one of the points named.

A shoal, from whaler report, lies in lat. $35^{\circ} 0' S.$, $155^{\circ} 0' W.$ It may be the same as the above.

* A group of islands is placed by M. Vincendon-Dumoulin in lat. $21^{\circ} 50'$, long. $150^{\circ} 0' W.$, apparently sand or coral; and on Mr. Purdy's chart there is another island, in lat. $21^{\circ} 20' S.$, long. $149^{\circ} 20' W.$

Captain Moses, of the barque *Henry*, reports the loss of that vessel on a coral reef, in lat. $22^{\circ} 47' S.$, long. $151^{\circ} 7' W.$, over which there was only 11 feet water. Traders do not believe it to exist.

A reef was reported on hearsay by Captain Hammond, in lat. $24^{\circ} 45' S.$, long., $148^{\circ} 20' W.$

appears flat. There is no outlying reef, but a mass of coral extends 15 or 20 yards out from the coast line, and serves as a breakwater to it. There is no opening, therefore no port. The sea around is of great depth, without any danger. Communication is made by means of canoes, at high water.

The principal village, Oneroa, lies on the west side, where ships desirous to trade ought to come. With the usual winds it is preferable to make it from the south, for the current sets north-westerly. The chief exports are cotton, coffee, arrowroot, cocoanut oil, and copra. Pigs, turkeys, fowls, ducks, yams, sweet potatoes, and pine-apples are also produced. It is necessary to go three miles inland to procure water.

Rarotonga is a mass of mountains, about 2,900 feet high. It is about 30 miles in circuit, surrounded by a reef, from the shore an average distance of half a mile. It may be seen 15 leagues.

The principal village, Avarua, is on its north side. The entrance to it may be about 50 yards broad within the reef, where schooners of 100 tons can enter and moor to the reef on either side. Another, named Atauia, is in the S.E.; Ngatangia on the East; and the last, Arognani, in the N.W. Atauia, the most important after Avarua, is a bad harbour; the recent loss of some coasting vessels offers little encouragement for others to follow them. Arognani is only a boat harbour.

The productions of this island, which is much more fertile than Mangaia, are exactly the same. Oranges are produced here in great abundance; cargoes of them, with pine-apples and bananas, are continually being exported.

The anchorage off Avarua, on the N.W. side, is perfectly sheltered from southerly winds, but is very dangerous with north-westerly ones, which blow right in. Large vessels standing off and on should be careful not to get too close in-shore, especially on the west side of the settlement, as there is a considerable set on-shore, and several ships have been wrecked, there being deep water and no anchorage until about one-quarter of a mile of the edge of the reef. A remarkable peak when bearing about S.E. by S. $\frac{1}{4}$ S. marks the entrance. The following is supplied by Captain H. Wilson, viz:—"Avarua Harbour (only fit for vessels of 200 tons and under).—The entrance between the break in the reef is about a cable wide, with a large rock in the centre which has two or three feet on it at low water; within this it expands to a width of some two cables, and depth from the rock to the shelving sandy shore, of some four or five cables. The depth of water is from about seven fathoms inside the rock to five fathoms at about one cable from the beach, inside which it shoals gradually. Two mooring anchors are laid down on the east side of the harbour close to the reef (which curves back to the shores from each entrance point), intended for the starboard bow and quarter chains of vessels, which lie moored with their heads seaward. To enter,—the pilot, who will board on a signal being made, will take a vessel in and moor her with the assistance of his boat's crew. The entrance rock must be rounded close to the westward, when shorten all sail and round-to to port, letting go the anchor when abreast the outer mooring, to which the starboard bow chain is attached. In fine weather at times as many as eight or ten small vessels have been moored here at one time in tiers." At the bottom of the bay is a brook where water is got easily.

South Sea Island cotton is grown, also coffee of good quality, which forms one of the chief exports.

"From Auckland to Rarotonga make the easting South of 30 S. till near meridian of group; returning keep northward of 30 S. till westing is made; but in summer a straight course for the Barrier may be made."—Capt. Murray.

Vatiu, Atiu, is about eight miles long. Centre of the island, lat. $20^{\circ} 4' S.$, long. $158^{\circ} 8' W.$ Cook describes his friendly reception by the natives at great length. The highest point, about 380 feet high, may be seen 25 miles. There are three villages on the island. The island produces cocoa-nut oil, copra, cotton, arrowroot, and sponge. Other produce like the rest of the group. Storms from between S.S.E. by the S. and W. to N.N.W. sometimes occur in February and March. The north side is the best to make. Small vessels can anchor in 16 fathoms, on a small patch on the edge of the reef, sheltered from the south, but should not pass the night here, in case a north wind should set in.

Takutea or Fenua-iti is in $19^{\circ} 51' S.$, long. $158^{\circ} 16' W.$ and about three or four leagues from Atiu; is some three miles in circuit; the land does not rise higher than six or seven feet, with clusters of cocoa palms and vast numbers of other trees. It is destitute of water.

Mittiero, 25 miles north-eastward from Atiu; it is low, with a clump of trees in its centre; from three to four miles north and south, and a mile east and west. It produces a small quantity of cocoa-nut oil and copra.

Mauki, or Parry Island, also low, is about two miles in diameter, well wooded, and about 40 feet above the sea level. It is in $20^{\circ} 7' S.$, $157^{\circ} 11' W.$ A small quantity of copra and cocoa-nut oil is produced, but no cotton. Other productions the same as at Mangaia. Whalers often call here and procure men.

Hervey Islands.—This name has sometimes been extended to the whole group. Cook says that they consist of three islands, surrounded by a reef, which may be six leagues in circumference. The inhabitants call two of them, perhaps the largest, Manuai and Auotu (Bethune) or Uitate.

Aitutaki, or Whytootake, is the northernmost of this group; it is given as 10 and 18 miles in circuit, $18^{\circ} 50'$ and $18^{\circ} 54' S.$, $159^{\circ} 41' W.$ It is low, except at its N.E. side, where is a hill about 450 feet high; a reef extends S.W. for seven or eight miles, and should be approached with caution. The settlement of Arutanga is on the N.W. side, with a break in the barrier reef off it where boats can enter, but no anchorage for trading vessels; they can, however, approach the reef, as there is always an off-set. Hurricanes occur about once every seven years, and are very local, the worst months are from December to March inclusive. Commencing at N.W. to north, ending at S.E., they do immense damage.

Copra and cocoa-nut oil are exported. On the western side of the island the chapel and schoolhouse are large and conspicuous. The channel through the reef, marked by a beacon, is a mile long, and very narrow, with six to ten feet water in it. A jetty is constructed at its head, where there is a supply of water. American whaling ships call annually for wood, water, and supplies.

The reef commences at a rocky point terminating the beach, at the S.W. end of the island, and extends in a S.W. by S. direction, connecting the island with another small one covered with trees, five miles distant; from this small island the reef continues nearly due east for eight miles, enclosing a group of seven or eight small islands, all thickly wooded. The southernmost of the group is in lat. $19^{\circ} 1' S.$

The above, it is believed, constitute the whole of the group. They produce cocoa-nut oil, copra, cotton, arrowroot, fungus, dried bananas, barley, maize, etc., and have valuable timber.

Palmerston's Island is a group of 9 or 10 small islets, circular in form, connected by a coral reef, and covered with trees, but no water. The N.E. portion of the group was submerged by the effects of a hurricane in 1865, and is now dangerous, several wrecks having occurred. The West Islet is in $18^{\circ} 5' 50'' S.$, $163^{\circ} 10' W.$ * There is temporary anchorage in a bight on the lee side. Arrowroot, turmeric, etc., grow well. There are dense groves of cocoa nuts, capable of yielding a large amount of copra. Also some valuable timber, like Spanish mahogany, and some turtle and beche-de-mer. There is a pond of fresh water.

Haymet Rocks, two rocks about a quarter of a mile apart, with

* NEW ISLAND.—According to M. Dutailis, this island, which from private interests would remain unknown, lies, it is said, in lat. $24^{\circ} 20' S.$, and long. $159^{\circ} 30' W.$ In addition to the position above given, Commander Hamond, H.M.S. Salamander, states that an island exists in lat. $24^{\circ} 0' S.$, long. $159^{\circ} 10' W.$ This must be the same, if such an island exists, which is very doubtful, and totally disbelieved in by South Sea traders.

TUANAHAE (?) is also an island announced as doubtful by Commander Hamond, in lat. $26^{\circ} 30' S.$, long. $160^{\circ} 25' W.$ It is called Tuanaka by Capt. Gray, United States Consul at Tahiti, and placed by him in $25^{\circ} 50' S.$, $160^{\circ} 55' W.$

Drotoi Island, a whaler report, in lat. $27^{\circ} 17' S.$, long. $159^{\circ} 40' W.$, is in this vicinity, so that there may be an island hereabouts; but Capt. Harvey, R.N., in H.M.S. Havannah, could not find them in the assigned positions.

apparently but seven or eight feet water over them. Lat. $27^{\circ} 11' S.$, long. $160^{\circ} 13' W.$

Orne Bank, with 16 fathoms water over it, is placed on the chart in lat. $27^{\circ} 40' S.$, long. $157^{\circ} 45' W.$

Maria Theresa Reef is placed on the chart in $35^{\circ} 20' S.$, $151^{\circ} 10' W.$

Beveridge Reef, or Lagoon Reef, a very dangerous shoal, no part of which appears above water, but the sea breaks over it in many places. On the inside of the reef appeared to be deep water. It is about 10 miles north and south, and 8 miles east and west. On the west side, near the S.W. point, there appeared to be an opening. Some portion of it appears to have become an island, a coral island being reported in the exact position, in length three miles, width about $2\frac{1}{2}$ miles.*

TONGA OR FRIENDLY ISLANDS.

The Tonga Archipelago, composed of at least one hundred islands and islets, lies between 18° and $22^{\circ} S.$, and 174° and $176^{\circ} W.$ Tonga-tabu, Vavu, and Eooa, are 15 to 20 miles in length. Seven others, namely, Lett , Toffoa, Kao, Namuka, Lefuka, Eoa, and Haano, are five to seven miles in their greatest extent. The rest are much smaller. Many are only banks of sand or coral, with tufts of trees. Toffoa, Kao, Lett , and the two rocks of Honga Hapa  and Honga Tonga can be seen 15 or 20 leagues. Eooa, Namuka, and Vavu are of moderate height. Tonga-tabu and the remainder are very low.

The climate of Tonga is humid, the heat oppressive; much rain falls. The trade-winds are by no means constant, and westerly winds occasionally blow in every season.

Scarcely a season passes without hurricanes, chiefly in February and March, but they have also taken place in November and December. They begin at N.W., veer Eastward, and end at S.E., the wind frequently changing, almost immediately, from one point to its opposite. They are local in their effects, and fall chiefly upon Hapa  and Vavu. If the fury of the storm be felt at Vavu, Tonga generally escapes, and *vice versa*; but Hapa  generally suffers, situated as it is between the two places.

S.E. and E.S.E. winds prevail in the vicinity of Tonga-tabu; but in February, March, and April, they frequently blow from W. and N.W., often for several days together, accompanied by showers of rain and violent gusts. A heavy swell from S.W. is almost continual, and keeps up a strong surf on the southern coast of that island.

Earthquakes are rather frequent.

TONGA-TABU GROUP.

The principal and southernmost group.

Eooa, or Eua, lies to the S.E. of Tonga-tabu, with a channel of three leagues between. English Road, on the north-west part of the island, is in $21^{\circ} 20' 30'' S.$, $174^{\circ} 52' W.$ It is about 10 leagues in circuit, and 600 feet high; rocky and barren.

Catto is two miles off the south end of Eooa.

Tonga-tabu, 36 miles in length from east to west, and eight miles in width, is of the form of an irregular crescent, whose concavity faces the north, deeply indented by a lagoon of five miles broad and three deep. Reefs of coral extend six or eight miles off the island on all its north part,

* DOUBTFUL REEFS.—On June 26th, 1842, the ship Thomas Dickenson, Captain Harans, passed a low reef, apparently level with the sea, about two ships' lengths in extent, N.E. and S.W.; being dusk, could not determine exactly. Lat. $21^{\circ} 32' S.$, long. $168^{\circ} 54' 30'' W.$ A reef, announced by the "San Francisco Herald" as in $21^{\circ} 42' S.$, long. $167^{\circ} 45' W.$, may be the same. Another report by a whaler places a reef in $21^{\circ} 40' S.$, long. $167^{\circ} 45' W.$

Thompson Reef is reported to lie about 200 miles E.S.E. of Tonga-tabu. Captain Thompson, of the *Acis*, stated that he saw the sea breaking heavily on it, and that it extended N.E. and S.W. about 3 miles. From good observations it was placed in at. $22^{\circ} 47' S.$, long. $171^{\circ} 48' 30'' (1854).$

and form different channels, with a useful roadstead. Many islets are on them, the greater part covered with trees. One of them, Eoa-Tehi (Eouagee or Eooajii), on an isolated reef, has a surface of a league in circuit. All the rest of Tonga-tabu, from its eastern point round south to the western, is totally different, the belt of coral rarely extending more than a cable's length off.

The island is nearly a dead level, with the exception of a few hillocks 30 or 40 to 60 feet high.

Fresh water is rare, but, by digging to a trifling depth, brackish water is generally obtained.

The products of Tonga-tabu are cocoanut oil, arrowroot, tapioca, cotton, and coffee, the latter in small quantities, although the island is admirably suited for both cotton and coffee. The principal articles in request by the natives are clothing, cotton-prints, etc., for which they pay in silver or oil, yams, pork, and poultry. The demand for European goods is, however, not increasing. The ox, horse, ass, sheep, pig, goat, and rabbit have been imported. Birds are numerous, including pigeons, ducks, fowls, turkeys, etc. Several European vegetables are grown, besides bananas, yams, oranges, pineapples, sugar-cane, sweet potatoes, etc.

There is a safe road in the northern part of the island, formed to the S.E. by the coast of Tonga-tabu, and to the E. and E.N.E. by two small islands, Panghai-motu and Hoolaiva. This harbour is a well-determined position. Panghai-motu is in $21^{\circ} 7' S.$, $175^{\circ} 15' W.$ The variation $10^{\circ} E.$ H. W. F. & C., 6h. 58m.; the tide rises 4ft. 9in. at springs, and 3ft. 6in. at neaps; the flood running S.E., the ebb returning to the same direction.

This road or harbour has two entrances, one from the east, the other from the north. The first between the coast of Tonga-tabu and a chain of islets and reefs. The length of the passage is three leagues east and west, and $1\frac{1}{2}$ miles broad, reckoning at a small island lying precisely in the opening of the road. This entrance is preferable to the northern one, and is called the Astrolabe channel.

DIRECTIONS.—Ships running for Tonga-tabu should make the island of Eooa, and, if toward evening, should keep off and on during the night, not losing sight of it, as there a current sets to the westward. At daylight bear up for the island of Eooajii (marked "Pilots" on chart) which leave on your starboard hand, keeping towards the reef surrounding Tonga. As you draw in, keep close to the reef on the port hand, for the passage cannot be seen until close-to. With a good look-out at the mast-head, and keeping the port reef close on board, it will be seen on the starboard bow. In the narrowest part of the passage is a sunken rock, which is avoided by keeping the port reef close on board. After passing this there is a clear passage up to the anchorage, in 16 fathoms, about a mile from the shore, abreast of a flagstaff, on which is generally a flag.

CAUTION.—A good mast-head look-out is required.

The pilot seldom comes out until past the narrowest part of the passage, and then he is not required. It is H. W. F. & C. at Sh.; the rise of tide is $8\frac{1}{2}$ feet, with easterly winds.

THE NORTH PASSAGE, N.E. OF ATATAA ISLAND.—The following is adapted from the chart:—"The entrance to the northern passage is over five miles north-eastward of Atataa, between the outlying reefs and patches. The passage appears broad and straight, and lies in about a S. by W. and N. by E. direction, some four miles, when the Juno Shoal, with $2\frac{1}{4}$ fathoms on it, rather on the eastern side of the fairway, and nearly four miles eastward of Atataa, must be left to the eastward; thence to the anchorage as before." It is distinguished by the church, built on the only rising ground near. Anchorage in 14 fathoms is had, with the church south, and Pangai-motu just shutting in with the distant mainland E. by N. The north passage is to be preferred in going out."

The landing is awkward, as a reef extends a quarter of a mile from the shore. But just eastward of the church a cut has been made, which admits a boat to approach the shore at high water. A pilot will come off on a signal being made."

Admiral D'Urville gives the following:—"The Fafaa Reef extends nearly a mile to the west. Up to this the depth varies from 18 to 10 fathoms;

but as soon as you reach the line joining Malinoa and Holoa the bottom has patches of coral, some of which have not more than $3\frac{1}{2}$ fathoms on them, perhaps less. The mouth of the pass is between the N.E. extreme of the Atataa Reef and a bank of detached reefs more to the east, about three miles N.E. $\frac{1}{2}$ N. from Atataa, and not over 1,600 yards wide. It is safe throughout, and easily made. In leaving the anchorage of Panghai-motu to reach this passage, steer first for the point of the Fafaa Reef, and from this to N.N.W. for four miles. You will then see the two reefs, taking care to keep close to the wind. The channel is hardly half a mile long; then, steering to N.W., you will soon be clear of the breakers to the north of Tongatabu."

H.M.S. Dido, in 1873, passed within a quarter of a mile of a reef on which the sea was breaking heavily, about three miles N. by W. from the north extreme of the main reef, on the north side of Tonga-tabu. In this part of the group, allowance must be made for the current, which sets strongly to the westward.

Pilots can be obtained at Euaigee Island, four miles N.E. of East Point, Tonga-tabu.*

North Star Reef, a dangerous outlying coral bank, lies N. 54° E., 17 miles from Tonga-tabu, or, according to Lieut. Raper, in $19^{\circ} 20'$ S., $173^{\circ} 45'$ W.

Two small islands, Hunga Tonga and Hunga Hapai, lie between Tongatabu and Namuka, each about $1\frac{1}{2}$ miles in circuit, 150 feet high, and may be seen 15 leagues.

NAMUKA GROUP.

Namuka is composed of a steep, rugged, coral rock, 9 to 10 feet high, except where there are two sandy beaches, with coral reefs to seaward. In the centre of the island is a salt-water lake; yams, plantains, bread-fruit and coconuts.

To the north and east of Namuka a vast number of small islands lie scattered at unequal distances, in general as high as Namuka, but only from two to three miles to half a mile in length, some less. Most of them are clothed with trees.

"The Falcon observed breakers bearing S.S.W. $\frac{1}{4}$ W. 4 to 5 miles on what was supposed to be the Culebras Reef, with Honga bearing S. $\frac{1}{2}$ E., and the top of Kao seen over the eastern part of Tofoa N. by E. $\frac{1}{2}$ E.; the position of the breakers was ascertained to be in $20^{\circ} 19'$ S., $175^{\circ} 24'$ W. The top of Kao in line with the centre of Tofoa, would lead on or very close to the reef.

"CAUTION.—As the Friendly Islands are not yet surveyed, and the position of many of the off-lying dangers still remains doubtful, more than ordinary care is necessary.

"The reef sounded on by the Falcon in $19^{\circ} 18'$ S., $174^{\circ} 15'$ W., is the same as that seen by the Eugenie 25 miles N.N.E. $\frac{3}{4}$ E. from N.E. point of Haano; and may also be the Disney Shoal, marked on chart 20 miles farther westward" (Query—Chart shews Disney Shoal 33 miles to eastward.)—Hyd. Notices.

The Culebras Bank lies westward of Namuka Islands, but not in the position assigned to it; according to La Perouse it is six miles in extent, N. by W. and S. by E.

The Hapai Group is composed of four larger and numerous smaller islands, connected by coral reefs. Cook named them Haano, Eoa, Lefouka, and Hoolaiva. These islands are very low; the reefs do not extend more than a quarter of a mile on the eastern side of the northernmost islands. In rounding Haano, the northernmost, give the N.W. point a berth of half a mile, to avoid a reef off it. From the point N.N.E. $\frac{3}{4}$ E., 6 miles, lies a bank with only three fathoms on it.

The Esk passed about half a mile north of the six-fathom patch S.S.W. from Loohooga Island; it appeared to consist of a series of irregular patches of coral, of about a mile in extent.†

* H.M.S. Barracouta, 1876: Breakers were seen on the N.W. side of Tongatabu in $20^{\circ} 54'$ S., $175^{\circ} 28'$ W.

† H.M.S. Barracouta, 1876—The shoal marked six fathoms lying S.W. by W. $\frac{3}{4}$ W. from Loohooga extends two miles farther to the S.S.W. $4\frac{1}{2}$ fathoms were obtained with the island bearing N. 20° E.

Captain Gordon, R. Yacht "Wanderer" sighted and passed near to the Loohooga Shoal not laid down in any chart. He was steering N.W. by W true course from Tonga for Fiji. It appeared to be 6 miles in length from N.E. to S.W. The shoal water was very green & sea was breaking heavily upon it. Position of Shoal—by observation Lat $20^{\circ} 51'$ S. Long $175^{\circ} 26' 30''$ W. Aug 1881.

After passing south of Mangone Island the islands of Lefuka, Foua, and Haano appear as one long, low line of land, broken by gaps; Lefuka anchorage is westward of the second gap from the northward.

Lifuka is about seven miles long, and some two or three broad. Its East side exposed to the trade wind, has a reef running to a considerable breadth from it, on which the sea breaks with great violence. A continuation of this reef joins Lifuka to Eoa, not above half a mile distant. No good water can be got. Near its South end, on the West side, is an artificial mount 40 feet high, and 50 feet in diameter at its summit. Great caution should be used in sailing in and out of this part of the group.

"The anchorage of Lifuka in $19^{\circ} 48' 12''$, $174^{\circ} 20' W.$, is by no means a good one, being much exposed to the bad weather and high seas from the westward, the outstanding reefs affording but little or no shelter from the violent gales from that quarter, which frequently occur, particularly in February and March."—Captain Worth, R.N.

Hoolaiva, connected to Lifuka by a coral reef partly dry at low water, has also an artificial mount. The East side has a reef like Lifuka, the West side has a bending at the North part, where there seemed to be anchorage.

The **Kotoo Group** may be almost considered a portion of the Hapai Group, being more or less connected by coral reefs. Cook says they are separated by a channel seven or eight miles broad, but which is narrowed by a reef. The two islands forming the North end of this channel are Neeneva to the East, and Foutoua, or Footoolha, to the West. The largest island is Kotoo, scarcely two miles long, and about the same breadth; a coral reef surrounds it. Its N.W. extremity is as low as Hapai. Around it are eight other islands, as shown on the charts.

Tofoa, or Tofofa, an active volcanic island, lies N.W. of Kotoo, in lat. $19^{\circ} 45' S.$, long $175^{\circ} 3' W.$, 2,800 feet high, and about five miles in diameter.

Kao is a vast conical rock 5,000 feet high, N. Eastward of Tofoa. Is in $19^{\circ} 42' S.$, $175'' W.$

VAVU GROUP.

The northermost cluster and one of the most important, lies 70 miles N.N.E. of the Hapai Group, but in the intervening space are coral shoals. The local pilots say there is a continuous line of soundings between the Hapai and Vavu Groups, and that the sea has been known to break heavily in 20 fathoms.

The **Disney Shoal**, (see caution p. 205) a very dangerous reef, lies some 45 miles to the S.E. of Vavu. Captain Disney obtained soundings in nine fathoms, sand and coral rock, deepening to 40 fathoms; but, from appearances, there was much less water than this. Lat $19^{\circ} 15' S.$, long. $173^{\circ} 40' W.$ This would make it N.E. 40 miles from the N.E. point of Haano. Until further examination is made, caution should be used.

The **Campion Shoal** (1860) lies to the East of a sandy islet South of Vavu, in $19^{\circ} 4' S.$, $173^{\circ} 52' W.$, extending four miles to the S.W. (Chart gives $19^{\circ} 8' S.$; also the Accou Jago shoal in $19^{\circ} S.$, $173^{\circ} 52' W.$)

The **Home Shoal** in $19^{\circ} 4' S.$, long. $174^{\circ} 45' W.$ (PD) S.S.W. of the peak of Letté, is probably that seen by Captain Montgomerie, in H.M.S. *Blanche*. He describes it as a rock a few feet above water; but, owing to the thickness of the weather, the correct position could not be ascertained. Lat. $19^{\circ} 17' S.$, long. $174^{\circ} 45' W.$ (approximate).*

Vavau is the principal island of the group.

Port Refuge (from Sir E. Home) on the West side approached from the West, has a remarkable appearance. It is highest towards the North, sloping gradually to the South. The whole is a group of numerous islands with abrupt sides. The extreme point North is of moderate height, South

* H.M.S. *Sapphire*, 1878, reports:—Passed within three miles of the reef marked P.D., in $19^{\circ} 18' S.$, $174^{\circ} 59' W.$; within $\frac{1}{2}$ miles of the rock reported 27 feet high (in $19^{\circ} 21' S.$, $174^{\circ} 51' W.$), and over the reported position of the Home Shoal; in no case was there any appearance of a reef, or of discoloured water. A reef awash is well known to the natives, about the place marked "reported dangers."

of it is a bold head of considerable height. Two others like it to the southward are islands. Towards the northern end of Vavu is a remarkable piece of table land, the highest, from which the land slopes off, all southward of it being islands of regular form, and low. The entrance is South of the highest head before mentioned. The South head is the North extreme of a larger island. When standing in with the North head on the port hand, two remarkable round flat-topped rocky islands will be seen; they cannot be mistaken. Between the northernmost of the two and the main is a detached rock. Passing between these small islands, a rocky point will be seen upon the left, bearing S. 83° E.; after rounding which, at a cable's length, a higher point, covered with trees, will appear also on the left, bearing N. 47° E. The passage appears narrow. Southward and eastward the land is composed of numerous islands with several openings to the sea, and between some, breakers extend quite across; the eye guided us in. A lumpish hill covered with trees will soon open, and a small low green island which is left on the right hand. We anchored under this hill in 30 fathoms sand, with a sandy point N.E., and the hill North. The village, Neafu, is on a rising ground, with a hill at its back, rendered conspicuous by the large boat-houses on the beach. From the anchorage to the village the water is deep, the shoalest being five fathoms, but the bottom is bad. The usual anchorage above Sandy Point is secure; the bottom is sand. The chief product of the island is cocoanut oil, a little sugar-cane and cotton being grown. Yams, sweet potatoes, taro, bananas, pineapples, cabbages, and onions, were under cultivation.

Lieut. Creak, R.N., says:—To round Sandy Point, keep the Talau shore close on board till past the reef, which generally shows plainly. The longitude of Sandy Point was 174° 1' W. Talau was found to be 440 feet high.

The village of Neafu is in 18° 38' 20" S., 173° 55' W.

We cannot here describe the coral reefs and islets which extend to the southward of Vavu. They reach to lat. 20° S.

Lette Island lies to the West of the Vavu Group. The peak, 1,790 feet high, is in the centre of the island, from which the hill falls with a gradual slope to the sea. It is six or seven miles in circuit, and can be seen 20 leagues off. It is in 18° 50' S., 174° 37' W. by the chart.* (A line of breakers, a considerable distance west of the islands, was seen by Sir E. Home).

Amargura or Fanoualie, the northernmost of the group, is formed of two hills (the N.E. the highest), connected by a low space, surrounded by rocky cliffs, except in two places on the west side. It is in 18° 2' S., long. 174° 18' W. There is said to be a dangerous reef about four miles west from it.

In August, 1847, Amargura was destroyed by the eruption of its crater; banks were also said to have been raised above the level of the sea eastward of Tonga-tabu.

Toku is a small low island, 11 miles S.E. of Amargura, in about 18° 10' S., long. 174° 8' W.

Tonga is unquestionably extremely fertile: it produces coffee, cotton, arrowroot, tapioca, copra, fungus, beche-de-mer, the candle nut; also pearl and turtle shell, but not in large quantities; ginger, cinnamon, &c., and some woods valuable for dyeing. The native cloth or tappa is extensively made. Their houses are sometimes extremely handsome both in the shape and in the decorative style of the coloured sinnett ties within.

South-westward of Tonga-tabu is a cluster of reefs and an island, apparently a prolongation of the line of land composing the Tonga Archipelago, which, as it is subject to earthquakes, may assume a dangerous character should the depth of water be lessened through this agency.

Pylstaart Island does not belong to any particular group. It is in 22° 25' S., 176° 4' W., 700 feet high, covered with trees (cocoanut among the number); three miles long, and without anchorage.

* A small island 200 yards long was passed by H.M.S. Sapphire, 1878, in 19° 11' S., 174° 49' W., S. 17° W. 23 miles from Letté Island; it ejected white smoke, and was covered with sulphur.

Pelorus Reef lies 37 miles S. by W. from Pylstaart Island, which is in sight from it. It is about a quarter of a mile in length, with not over one or two fathoms on its western end, at the extremity of which breakers were visible. Position by chart, $22^{\circ} 59' S.$, $176^{\circ} 19' W.$ Midway between Pelorus Reef and Pylstaart is a bank of 22 fathoms.

Seymour Bank, of six and a-half and seven fathoms, very steep-to, in $21^{\circ} 43' S.$, $176^{\circ} 42' W.$ It may be that this is a growing coral reef, therefore the utmost caution is requisite, as the lead may not be of much use in nearing it.

La Rance Banks.—Three-and-a-quarter fathoms, then 12, 22, and 19 fathoms, were found on a bank which appeared to extend four miles in a north and south direction.

When La Rance crossed the west part of this bank, the look-out man reported a large bank about nine miles to the N.W., with the sea breaking over it; a lagoon was observed at its N.E. end.

A third shoal bank was also seen about two miles northward of La Rance, with apparently less water on it than on that which was sounded over; lastly a fourth bank was observed about 11 miles to the southward, which appeared to have a greater depth. The position of the depth of $3\frac{1}{4}$ fathoms was determined to be in $24^{\circ} 18' S.$, $176^{\circ} 1' W.$

McCloud Bank, of 17 fathoms, is placed in $25^{\circ} 12' S.$, $178^{\circ} 30' W.$

Ono Islands, a group of several small islands, the highest 370 feet high, the largest three miles long and $1\frac{3}{4}$ miles broad. A chain of coral reefs, seven miles long, N.E. by N. and S.W. by S., surrounds the group, the centre of which is in $20^{\circ} 39' S.$, $178^{\circ} 40' W.$ No anchorage.

Bereghis Reef, 10 miles to the S.W. of the islands, is $2\frac{1}{2}$ miles long N.E. and S.W., and two miles wide, awash, and always breaking.

Mikhæloff and Simonoff Island, two small islands about 90 feet high, south of the Ono Islands, separated by a channel six miles wide. The first $1\frac{1}{2}$ mile long and $\frac{1}{2}$ mile broad. They are surrounded by a reef at the distance of a mile. Simonoff is in $21^{\circ} 3' S.$ $178^{\circ} 46' W.$

Calinon Reef, described by the Tongese as two or three feet above the sea, about a quarter of a mile in extent, no vegetation, and risen lately from the effects of an earthquake; and as the natives are seldom mistaken on such points, they may be trusted. It is in about $20^{\circ} 21' S.$, $179^{\circ} 24' W.$, or 35 miles north-westward of Ono. The natives also say there is another bank more westward, in the direction of Fiji, longer than the above, and not above the level of the sea.

Minerva Reefs.—Two reefs whose character and position were accurately established by Captain Denham, R.N., in the *Herald*, 1854. The northern reef has a passage, a cable wide with a depth of 15 fathoms, on its N.W. side into smooth water within. Two cables off the entrance is a depth of 55 fathoms. The northern reef is circular, about three and a-half miles in diameter, enclosing a space with from three fathoms at three cables from the edge of the reef to 15 and 17 fathoms in the centre.

The southern reef resembles the figure 8 in shape, and encloses two separate lagoons. Its greatest length is E.N.E. and W.S.W. five miles, with a breadth of two miles. There is an entrance into the easternmost lagoon—Herald Bight—on its N.W. side, and off it a sheltered anchorage during the S.E. trade. This entrance is a mile wide between the reefs, but patches of 9 to 12 feet extend three-quarters across from the northern side. The navigable passage, two cables wide with 15 fathoms, lies southward of these. Inside is a circular space of smooth water, one and a-half mile in diameter. Two sunken dangers lie within half a-mile of the entrance, three cables from the southern shore of the lagoon; a third lies two cables S.S.E. from the innermost; and one and a-half cable from the reef.

Northern Reef, observation spot on N.E. side of reef, $23^{\circ} 37' 19' S.$, $178^{\circ} 49' 39' W.$ Southern Reef, Herald Bight, on south side of entrance, $23^{\circ} 56' 22' S.$, $179^{\circ} 4' 57' W.$ H.W., F. & C., Sh.; rise 6 feet.

KERMADEC ISLANDS.

A scattered group of islands to the N.E. of New Zealand, very badly placed on the charts, in West longitude.

Raoul or Sunday Island, the northernmost, of triangular form, four leagues in circuit, is a steep, rugged mountain, 1627 feet high; the rocks rise like basaltic columns.

Captain Denham, H.M.S. Herald, says it offers three anchorages, according to the winds; that water, vegetables, and poultry, could be procured by the whalers. Observation spot in West bay is in $29^{\circ} 15' 30''$ S., $177^{\circ} 54' 52''$ W. H.W., F. & C., 6h; rise 5 feet.

Macauley Island, a small round island, very steep, is about three miles in circuit and about 750 feet high; half-a-cable off its S.E. point is a small rock, lat. $30^{\circ} 16'$ S., long. $178^{\circ} 32'$ W.

Curtis Island is composed of two rocks of moderate height; the largest, double the size of the other, is half a mile long, about 500 feet high. The channel between is 400 yards wide. It may be taken as in $30^{\circ} 36'$ S., $178^{\circ} 37'$ W.

L'Esperance Rock (Brind's or French Rock) is 577 feet high, of small extent, placed by D'Entrecasteaux in $31^{\circ} 27' 30''$, $179^{\circ} 5'$ W. The Havre Rock was seen by a whaler about four leagues N.W. of it. It was again reported by a whaling captain (with the two following) as 10 miles N.N.W. from French or Esperance Rock. It is awash, and breaks heavily in bad weather.

The second reef lies 45 miles E.N.E. from the Esperance Rock, said to have 12 feet water on it; no breakers were discovered; $31^{\circ} 14'$ S., $178^{\circ} 8'$ W.

The third was found to be in $31^{\circ} 28'$ S., $178^{\circ} 10'$ E., bearing W. 133 miles from Esperance Rock. Heavy breakers with much wind. Another reef, which may be the same as the preceding, is marked on the French chart in $30^{\circ} 55'$ S., $178^{\circ} 5'$ E.

Between the southern extremity of the Friendly Islands and New Caledonia there are several islands and reported reefs.

Conway Shoal (or Rapids Reef) lies in $21^{\circ} 44' 48''$ S., $174^{\circ} 37' 45''$ E. As ascertained by Captain Denham, the sand islet on it is five feet above water. Some mould was landed, and some coconuts planted in the hope they might make a beacon for this fearful reef.* (In 1867 none of these remained).

Hunter Island is a volcanic block 974 feet high, at its base half a mile north and south by one-third of a mile across. From its abrupt wooded slopes jets of sulphurous vapour issue; it is not in other respects active as a volcano. There are 40 fathoms within half a cable of its base, black sand, and no outlying dangers, though eddies extend nearly two miles off its north-western side. It is in $22^{\circ} 24' 2''$ S., and $172^{\circ} 5' 15''$ E.

Matthew Island, 465 feet high, is small, and can be seen 11 or 12 leagues. It is in $22^{\circ} 20' 12''$ S., $171^{\circ} 20' 30''$ E.

La Brillante Shoal, a very dangerous reef, appears to be a round mass of coral about 150 feet in diameter, the more dangerous as the sea did not break on it when discovered, although there was a heavy swell. Two soundings in 20 and 23 fathoms were obtained; but it was thought there was not over $6\frac{1}{2}$ to 10 feet on it, as the sea was quite yellow. Its position was taken

* The Oloengu and the Edith or Somme Reef in about above position were searched for in vain by H.M.S. Alacrity, and positions sailed over by Captain T. McKay, and are believed not to exist. Another, the Vibia Reef, placed in $31^{\circ} 50'$ S., $178^{\circ} 20'$ E., may probably be included in this category.

The Isabelle reported dangers in the following positions, in $22^{\circ} 5'$ S., $179^{\circ} 15'$ W. in 22° S., $177^{\circ} 46'$ E.; and in $22^{\circ} 38'$ S., $174^{\circ} 53'$ E. (a horseshoe reef). The Atalanta, Admiral Roussin, passed three miles north of the first, 6 miles north of the second, and two miles north-west of the third, but saw no indications of any danger. Sprague Reef is said to have been discovered by the Mercator in $21^{\circ} 52'$ S., $178^{\circ} 36'$ E. Captain McKay passed over this position in October, 1880, and saw nothing of it. In January, 1872, La Rance passed near a patch of discoloured water which appeared to extend north and south six miles. The estimated depth was 8 to 11 fathoms; it was placed by observation $24^{\circ} 11'$ S., $172^{\circ} 54'$ E. The schooner Melanie, 1870, reports a rock of reddish colour, about three feet out of water in $21^{\circ} 26'$ S., $170^{\circ} 57'$ E. The Kreimhilda one in $24^{\circ} 50'$ S., $175^{\circ} 20'$ E.

to be $23^{\circ} 13' 52''$ S., $169^{\circ} 55' 38''$ E. It was seen by the *Creole*, October, 1859, placing it in $23^{\circ} 14'$ S., $170^{\circ} 6'$ E. The shoal part, not more than two cables' lengths in circuit, with not over six feet water on it. It was also seen, the sea breaking fearfully on it, in October, 1869, by a Norwegian barque, very near the surface of the sea—perhaps only two or three feet water on it—as the tops were occasionally seen, extending about half a mile, and seen from the mast-head plainly several hours, the weather being very calm. Round the reef the water had a yellowish colour. No bottom with 95 fathoms within a mile of it.

Walpole Island is a narrow table surface, coral structure, rising 229 feet above the base of its perpendicular cliffs. It lies north and south $1\frac{1}{2}$ miles, and a quarter of a mile in breadth; very difficult of access and uninhabited. The southern extreme in $22^{\circ} 38' 7''$ S., and $168^{\circ} 56' 45''$ E. It is free from outlying dangers; there are 180 fathoms half a mile off its southern extreme.

O'NEILL BANK, of 13 fathoms, lies 10 miles north of Walpole Island.

Durand Reef is in $22^{\circ} 2' 25''$ S., $168^{\circ} 39' 34''$ E. It covers six to nine feet, and breaks occasionally; its 9 feet ridge forms a circle of two-thirds of a mile diameter. The lead will not warn approach to Durand Shoal, as there are 210 fathoms coral grit within half a mile of its breakers.

Norfolk Island is a beautiful island and is occupied by the descendants of the interesting community from Pitcairn Island, who, 194 in number, were brought thence in 1856. The head-quarters of the Melanesian Mission are also established here in the north-west part of the island.

Norfolk Island, the principal, is N.W. $\frac{3}{4}$ W., 425 miles from North Cape, New Zealand. It is nearly 5 miles long, and about $2\frac{1}{2}$ miles wide. Its greatest elevation is the double summit of Mount Pitt, 1,050 feet high, on the northwest corner of the island. Its sea front is high and precipitous, the cliffs being 200 and 250 feet high.

There is no anchorage round the island sheltered from on-shore winds. With winds from the north-west round by north to about east the anchorage in Sydney Bay is safe; with westerly winds round by south to south-east, in Cascade Bay, on the north side of the island; with all others winds, off Anson's Bay, near the north-west part of the islands, but here the water is deeper. About 10 or 12 fathoms may be had in the two former, but local traders go closer in, and are in the habit of shifting from one anchorage to the other according to circumstances. Approaching Sydney Bay anchorage, if it is safe or the landing practicable, a *red* flag is hoisted on the flagstaff, westward of the settlement. One of the residents will usually act as pilot to the best anchoring ground, which is in some parts rocky. Many anchors have been lost here. A stout buoy rope, with chain on the crown of anchor, and well buoyed, is necessary. Always endeavour to weigh on the weather tide, and with not more sail than is necessary to avoid tripping the anchor, which might then hook a rock or another anchor. Similarly in coming to, endeavour to veer at once enough chain to avoid dragging the anchor. Should the anchorage not be safe, or the landing not practicable, a *blue* flag will be hoisted, when a vessel will usually proceed to Cascade Bay, and generally find smooth and safe anchorage.

Strangers should not land in their own boats. The residents are skilful boatmen, and have good whaleboats. At Sydney Bay, even in fine weather, blind rollers occasionally come in, and break heavily outside the pier, and would overend any ordinary boat.

Sydney Bay, between Nepean Island and Point Ross, lies at the south side of the island. At low water a coral reef uncovers from 100 to 700 yards.

Philip Island is about $1\frac{1}{4}$ miles long, with an average breadth of three-fourths of a mile. It bears S, 20° E. $3\frac{1}{2}$ miles from the landing-place at Sydney Bay. Its highest part, a peak on its south side, is 200 to 300 feet less than that of Mount Pitt. It is everywhere precipitous. Half a mile south of it there is a rock above water. Rabbits abound on this island.

Nepean Island, 50 feet high and a quarter of a mile long, lies half a mile off the main island, south-eastward of Sydney Bay. There is a narrow passage between, with numbers of detached rocky banks. The channel has

a depth of four and five fathoms. N.E. by N. of Nepean Island, for a considerable distance, is a bank of sand and mud.*

Point Ross, the southernmost point of Norfolk Island, is the south-west point of Sydney Bay. Eastward of it to the bottom of the bay rocky banks extend a long distance off the shore, on which the sea breaks in a south-west gale or heavy surf.

The tide flows F. & C., at 7^h., rise five to seven feet. The flood runs to the westward and south-westward, and ebb to the contrary. The tide makes two hours sooner on the Norfolk Island shore than in the stream and over towards Philip Island.

NEW CALEDONIA AND THE LOYALTY ISLANDS

Belong to France. A penal settlement is established in the former. The progress of the colony has been slow. Cotton and sugar are grown in small quantities. Gold is worked in the valley of Diahot River, on the northern part of the island, and may stimulate its opening up. The necessaries of New Caledonia are mostly imported from New Zealand and Australia. A monthly line of steamers run between Noumea and Sydney; there is frequent intercourse with Auckland.

New Caledonia is about 72 leagues in length in a N.W. and S.E. direction and 10 in breadth. Throughout its extent are two parallel ranges of mountains separated by a central valley, but united here and there by transverse plateaux. The eastern chain has a regular and even outline, with a few prominent peaks to serve as landmarks. Their average height is about 2,500 feet, visible 50 or 60 miles off, commencing at Cape Coronation, the S.E. point; at Cape Colnett, in the N.E., it begins to decrease in elevation, terminating at the low N.E. point.

The western chain is higher and more irregular than the eastern, rising into points 2,500 to 3,600 high. Extensive coral reefs surround its shores and islets.

From the northern extremity of the island, in lat. 20° S., an immense reef, with many groups of islands, extends north-westward to lat. 19° 36', but have not been entirely examined. Still farther north is a group of islets, in 17° 44' S., the Huon Islets. The Isle of Pines, or Kunio, lies to the south-east of the south point of New Caledonia, the interval of 25 miles between filled with coral reefs, with deep and safe passages between. The south-east extremity of the group is in 22° 46' S., 167° 35' 30" E.

The south-west point of New Caledonia is **Uen Island**. A line of coral reefs extends from it to 23° 1' S., 167° 2' E., 35 miles, leaving a wide gulf between it and the Isle of Pines reefs.

THE CLIMATE of the group is like that of all tropical regions. The year is divided into two seasons, winter from December until April, variable winds, rains, and hurricanes; the other eight months the fine season, with regular winds from E.S.E. and fine weather, and at times squalls from S.W. to S. The western side, however, participates in the moonsoons of the Australian coast, and in July, August, and September, westerly and south-westerly winds are more prevalent. Hurricanes are most frequent in January and February, more violent to the north. Their southern limit is somewhere between Kanala and the Isle of Pines, for at the latter place they are not known. They are much dreaded in the northern ports, and loss is considered certain if the ship is not in a landlocked harbour, the reefs being then no shelter from the sea.

The CURRENTS generally are from S.E. to N.W., outside the reefs; within they are subject to the tides and directions of the channels.

The **Isle of Pines**, the south-easternmost end of New Caledonia, is 11½ miles from north-west to south-east, but the latter part is a separate island, divided by a narrow channel. It is difficult to give a clear description of of the island without a reference to the chart. The peak Ngao, on the S.W. part of the island, is conical, 880 feet high, visible 30 miles off, and from the S.W. shows double. It is in 22° 39' 20" S., 167° 29' E. South-east of it is a

* A sharp pinnacle rock with 12 feet water on it lies due south of west end of Nepean Island three-quarters of a mile, on which the *Mary Hamilton* was wrecked.

secure port called Vao. About three miles south of it is Alcène Island, which shelters another anchorage to the west of it. On the north side is the Gadji Anchorage, protected by the barrier reef; on the west side is Umœo Bay, with Victoria Harbour. South-east of the Isle of Pines is the Nokanhu Reef, with a narrow channel inside it.

From the eastward having made the Ngao Peak out, steer for the sand islets Ana or Ami, on the south-east side of the Nokanhu Reef, which lie about four miles from the south point of the Isle of Pines; the southernmost is at the fourth point of the reef. Having rounded this islet (not close-to, as the bank reaches off to the south-east), when it is on with the north-east side of the Lesser Isle of Pines, keep W. N. W. till the summit of the peak bears N. 16° E., when Alcène Islet (covered with pine trees) will be to the right of the peak. Great caution must be used in approaching the Alcène Passage, which is west of the island, as many coral patches lie in its entrance, only to be avoided by the eye. The channel is $1\frac{1}{2}$ miles wide between the island and a cluster of coral patches, which separate it from the Nokue Passage. The mark is Duroc Islet (small, with pine trees), immediately under the Nga Peak, in one with its east summit N. $\frac{3}{4}$ E. This will carry through in 6 to 10 fathoms, and clear of the reefs which extend half a mile westward of Alcène, which must be strictly guarded against. When the north-west portion of the islet bears S. E., bear to the E. N. E. and anchor as far in as needful, north of the island. With a good knowledge of the channels a vessel may keep on towards the peak and Duroc Islet till within half a mile of the latter, when an easterly course two miles leads to a more sheltered anchorage. Port Vao, anchor with the Mission Station N. N. W. in four fathoms. Neither of these anchorages can be considered safe, they are open from south to north-west; the squalls or gales from south-west are sometimes very violent. Besides this the tide is rapid; the flood sets west, the ebb to eastward. Although an indifferent port, it is a useful place for obtaining supplies. Water is readily got at the brook.

The Nokue Passage is more open and deeper (17 to 25 fathoms). On its north-west side is an isolated shoal and islet, Infernal Islet. It may be entered by bringing the Nga Peak to bear N. E. $\frac{1}{4}$ N.

The Nokanhu Channel, between the south-east reef and the Isle of Pines, is in its narrowest part two-thirds of a mile wide, least depth six and seven fathoms. The tides run slowly through it, but with the westerly flood there is a tremendous sea in it with south-west winds; with the south-east winds there is no swell, but the current is so violent that it needs a very fresh breeze to enable a ship to clear it. It is therefore not recommended.

The Torch Bank lies about eight miles south-eastward of Ami Islet (chart), and $17\frac{1}{2}$ miles S. E. by E. from the Peak, which bearing will be a guide for it. The depth obtained was 20 fathoms, coral bottom. From the latter fact the depths are probably less and decreasing.

Pine Islet (Gie), the northernmost of a cluster off the north end of the Isle of Pines, stands in the entrance to an anchorage to the east, and others on the west side of the island.

Gadji Anchorage, on the north-east side of the Isle of Pines protected from seaward by the Barrier Reef, near two miles off shore, has 10 to 20 fathoms all over it. There is an entrance to the south-east, and another from the north, keeping the Peak S. S. E. $\frac{1}{4}$ E., between Pine Islet and the coral reefs and sand-banks of the Barrier Reef to the eastward. The entrance and anchorage is free, as far as is known, from coral patches.

Umœo Bay, or Port Victoria, on the west side of the island, is surrounded by the low coral reefs, forming an area of about six miles by four miles, with several entrances. It is an exposed place to the prevalent wind.

The Botany Isles are small islets scattered over the line of reefs which extend from the Isle of Pines to Cape Queen Charlotte, the south-east extremity of New Caledonia. These reefs have several channels through them for which the chart must be the best and only guide, except the eye. The widest and deepest is the Sarcelle (or Teal) Passage, nearly midway between the two islands, over two miles wide in its narrowest part, with 30 to 40 fathoms water.

Cape Queen Charlotte, is the bluff south-east termination of New Caledonia, beyond which is some low land and a projecting reef, which forms the port of Goro (see plan)—or Cascades—entered from the South through two passes through the reef, well sheltered from the swell, but open to the wind.

The coast runs from it S.W. six miles to Cape Ndua, the bluff south point of New Caledonia. About midway is Wooded Port, a land-locked basin, entered by a narrow passage through the reef.

The Havannah Passage passes along the south-east end of New Caledonia, the fairway through being with Cape Ndua S.W. by W. On its south side is Kie Island, which, with Améré Island, are the only ones covered with the remarkable pines on the southern reefs, and will serve as marks for them. On the north side, and projecting from the eastern reef of Point Goro, is a bank of $4\frac{3}{4}$ fathoms, which adds to the violence of the currents. At times, during an hour at the change of spring tides, they form a bore where the whole passage is barred by a continuous line of breakers. It would not be prudent to attempt it at this period, but a short time afterwards the streams resume their ordinary condition.

Roche du Var is a dangerous sunken rock, having only six feet water, in $22^{\circ} 14' 25''$ S., $167^{\circ} 9'$ E., $7\frac{1}{4}$ miles N.N.E. $\frac{1}{4}$ E. from the entrance to Havannah Passage. From the rock a peak on the mainland is (in line with the south extreme of Nau Island) W.S.W., Cape Ndua S. 42° W.

The area south of Cape Ndua is strewn with coral reefs, which require an inspection of the chart. On two of them are islands, Nuare, low and bushy, four miles S.W. by S. of Kie Island, and south by east five miles from Cape Ndua. The other, Ugo, is $2\frac{3}{4}$ miles S. by E. $\frac{1}{2}$ E. (chart) from Cape Ndua. No written description will enable a ship to avoid these reefs.

Praslin or Prony Bay lies westward of Cape Ndua, and north-eastward of Uen Island. It has been thoroughly examined, is very extensive, and has abundance of fish. There is good depth and holding ground throughout. Many rivers enter this bay, forming cascades. Half a mile east south-eastward of Pine Point (which is opposite the north-eastern part of Nau Island) is a patch with three feet on it at low water. It is H. W. F. & C. at 8h. 10m.

Woodin Passage between Uen Island and the main is safe and clear throughout, no detached dangers (see the three foot patch off Pine Point), and 10 to 20 fathoms close to the shores. It is about 14 miles long, its east entrance is taken with Ia Peak, a rugged mountain 1,624 feet high at the south-west point of New Caledonia, bearing W. $\frac{1}{2}$ N. From its west entrance there is a comparatively clear passage to sea through the Bulari Passage, 20 miles to the south-west, or to Noumea, or the Port de France westward.

The best passage from the north end of Uen Island to Port Noumea is Tareti Passage passing north of Tareti Island or sandbank, which is some eight miles westward, and south of Nakae shoals. These, together with four northern banks on the south side of the channel, always show above water. From abreast of Four Northern Banks steer to pass between Mando and Maitre Islands. Tareti Passage is preferable to Porcupine Island Passage northward of it, as Oliver Bank and Provident Shoal are not always visible.*

Several good anchorages exist between the western entrance of Woodin Passage and Noumea, where a vessel could anchor for the night, or to await a change of wind or tide. The first is Uié Bay, with good holding ground and a stream on its northern side, but towards its head the bottom becomes rocky. N'go Bay, two miles to the north-west, is a small port, well sheltered but sometimes difficult to leave for a sailing vessel. Tareti Island is seven miles south by east from Mount D'Or, with anchorage a mile from its north-east side on sand bottom. Anchorage is also found on the east or west sides of Porcupine Islet.

Uen Island, or Waima, above spoken of, is $4\frac{1}{2}$ miles from north to south, high, rugged, deeply indented on its eastern side by Port Kute, clear

* H.M.S. Renard, 1878, reports:—Iron caged beacons have been placed on the following, viz.—the $\frac{1}{2}$ fathom patch (Moziman's Shoal), eastward of Pine Point the end of reef of the point westward of Cape Ndua; and on Hydrography shoal.

and deep when once inside, the entrance to which is on the southern side, past several rocky patches.

The Great Reef extends 35 miles S.S. Eastward of Uen Island. Its S.E. point is in $23^{\circ} 1' S.$ by $167^{\circ} 3' E.$ (An over-fall of discoloured water sweeps round it, one to three miles off.—Chart). There is very deep water close up to it. Hence its western face trends N.W. by W. for 85 miles to Port St. Vincent, gradually nearing the land from 15 miles abreast Uen Island to three miles off Port St. Vincent, and fronting the most important portion of New Caledonia, the French settlements near Bulari and Dumbéa Bays.

Mount D'Or, 2,543 feet high, is an excellent guide to the passages in its vicinity, and is the most remarkable landmark on this part of the coast; it bears from Ia Peak, at the N.W. entrance of Woodin Channel, W.N.W. 11 miles. It has a rounded top, surmounted by two small pinnacles close together, in some positions shewing as one. Its upper part is bare, of a reddish colour, unlike any other mountain in this part. It is detached from the interior chain, which is higher and more irregular. A cascade, 70 feet high, falls into the sea from its side.

Bulari Bay (or *Morare*) is westward of Mount D'Or. Its western side is formed by the peninsula which separates it from Noumea or Port de France. It is open to the South between S.W. and S.E., and is 13 or 14 miles within the barrier reef. Immediately on the North flank of Mount D'Or are some coal deposits. This part is bounded on the S.E. by a steep rock point, N.W. of which, half a mile, are some shoals. Within these latter, near to the shore, is good anchorage.

The S.E. point of the bay is formed by three or four islands (connected by shoal water), which stretch out $2\frac{1}{2}$ miles from the foot of the mount, and must have a good berth in rounding. A mile W.N.W. of this is Caledonienne Shoal, of nine feet, but steep-to; it lies $1\frac{1}{4}$ miles from the cascade before mentioned.

The south-western part of the bay is filled with mud banks. Ngea Island forms the S.W. limit of the bay. Between this island and Ducos Peninsula is Port Ngea, entered from the southward only, with a shoal of 13 feet in its mouth.

The **Bulari Passages** through the barrier reef lie with the summit of Mount D'Or, N. by E. $\frac{1}{4}$ E. 17 miles in about latitude $22^{\circ} 31'$. The reef here runs about N.N.W. instead of its usual trend of W.N.W. on either side. They may also be recognized by a small islet on the outer reef and another, Amedée Islet, within the reef, with its lighthouse.

The **LIGHTHOUSE** on Amedée Islet is a round iron tower, painted in red and white bands, 175 feet high, in $22^{\circ} 28' 44'' S.$, $166^{\circ} 27' 40'' E.$ The light is brilliant and *fixed*, elevated 150 feet above the sea level, visible all round for 20 miles.

Amedée Islet is of sand, covered with low bushes; within the barrier reef its lighthouse serves as a grand mark for the Bulari Passages.

In approaching the Bulari Passages in clear weather, the light may be seen from an elevation of forty feet at a distance of twenty-two miles. It is recommended that the light should be made between N.N.E. and E. by N., on account of the proximity of the reef either side of these bearings:—To enter the north-westernmost of the passages (the one recommended by the pilots), which is some 200 yards wide, and two miles S. 38° W. from the lighthouse, bring the latter to bear N. 38° E., and steer for it, until within the points of the reefs, when keep a little to the eastward to avoid the point of the great reef on the western side. after passing which steer to pass about a cable on either side of a detached reef which lies one mile N. by E. from the entrance; thence steer northward between the Thisbé Shoal with $1\frac{3}{4}$ fathoms on it—marked by a perch—on the south-west end of the “Four Western Banks,” and N.W. by N. $\frac{1}{4}$ N. $1\frac{3}{4}$ miles from the lighthouse; and a shoal about a mile westward of it. From this position Mount Ndoi on the south end of Ducos Peninsula will bear about N. $\frac{3}{4}$ W. distant eight miles, and kept on this bearing leads well clear of the shoal which extends one mile eastward from Maitre Island. When the north end of the latter bears about W. by N., course may be altered to about N.W. $\frac{1}{2}$ W., between it and the shoal

which extends $\frac{3}{4}$ mile W.S. Westward from the extreme of Ducos Peninsula, observing that Mount D'Or must not be shut in over the south extreme of the peninsula until the projecting point on the west side of the peninsula abreast the S.E. end of Brun Island opens of the white rocks at Pontillon Point to the southward of it, bearing N. $\frac{7}{8}$ W., which clears the shoal to the westward. A course may now be steered towards the middle of Du Bouzet Island, and round the north-west end of De Brun Island through the south (Little) entrance into the port. Capt. H. Wilson says that the pilots use only the above northern passage, where the tides set straight through; that the Lournois Shoal which divides the southern passages is much larger than as laid down, and that the irregular direction of the tides, and the dark colour of the water on the Lournois Shoal combine to make them anything but safe.

Nooumea lies on the west side of the Ducos Peninsula, within Du Bouzet Island. The water supply is good, boats can fill at the Government wharf. One of the first objects seen in approaching is the semaphore for signalling the approach of vessels, situated at the back of the town. There is a wharf where vessels drawing up to 23 feet can lie, also a jetty. Provisions are dear. The harbour is formed by the east end of Du Bouzet Island, which shelters a space $1\frac{1}{2}$ miles long by half a mile wide, with a depth of five to eight fathoms all over. The southern entrance is between the south-east point of Du Bouzet, and a small island, Debrun, to the south of it; the latter connected with the shore by shoal water. The north-east point, too, of Du Bouzet, has a sort of bar, with 19 feet water between it and the main.*

Du Bouzet Island, or Ile Nou, is $2\frac{3}{4}$ miles long from W.N.W. to E.N.E. It is narrow, and consists of a series of hills, of which two close together stand on its north-west end. The next eastward to these is Mount Jo, used as a mark for the entrance through the reef. The Roadstead lies between the north side of the island and a projection from Ducos Peninsula, a space three miles long, east and west, by a mile wide, with deep water all over, and shores bold-to. At its eastern end is a sort of bar above mentioned.

Capt. De Montravel says:—What struck us was the splendour of the harbour, formed by a peninsula, which presents in its cleft several creeks, of themselves fit to receive ships, and by an island which runs parallel to the shore, and is separated from it by a channel three miles in length, and about a mile in breadth. This channel, which offers anchorage in any part, sheltered from all winds, is divided into two parts by a bar at its narrowest part, without intercepting the communication from one to the other, by ships drawing less than 16 feet. It possesses the invaluable advantage of having two outlets, the one to the east, the other to the west, of the island, which serves it as a defence towards the sea. There is complete security and convenient ingress and egress with all winds.

The **Dumbea or Jitema Passage**, through the great reef, lies abreast of Port Nooumea, and is a safe and excellent entrance, 13 miles W.N.W. of the Bulari Passage, the Great Abore Reef being straight and continuous between them. The opening, nearly three-quarters of a mile wide, in $22^{\circ} 21\frac{1}{2}'$ S., $166^{\circ} 16\frac{1}{2}'$ E., is free from danger; the depth is from 50 fathoms in the entrance to 13 and 14 on its inner sides, and close to the reef, but on the south side, a small coral patch projects 200 yards, on which the depth suddenly diminishes from 20 to $6\frac{1}{2}$ fathoms, and is useful for anchoring in case of calm, or being drifted out of the course by the current. The current is almost always to the west from half to one mile per hour, modified by strong breezes from the southern quarter, during which it runs N.W. and N.N.W., two miles an hour, which makes it more dangerous as there is no anchorage on the north side. It is best to keep on the south side of the pass at one or two cables' lengths from the reef.

Dumbea Passage is distinguished from others by two wooded islets (on one of which, Ndu, is a beacon), one bearing N.N.E., the other N.E. from

* The port itself has five to seven fathoms in it: the roadstead—north of Du Bouzet Island—from seven to nine fathoms. H.M.S. Nymph in 1878 reports 16 feet water in this passage (pass between the red and black buoy); that a red buoy is placed on the north end of the 2½ fathom shoal abreast Bayonnaise Cove, which is being filled up, and that the point northward has been produced southward about one cable.

the middle of the entrance, each distant four miles from the pass, and $2\frac{1}{2}$ miles apart. There are no others of the same sort within the reef in this portion of the barrier. The northernmost, Senez or Te Ndu, can be seen two or three miles outside. Its stands on a coral bank, in the N.W. of which is an entrance for boats. The other islet, Laregnere or Nge, is smaller, not very remarkable, and cannot be seen very far.

Mount D'Or bears from the passage N. 72° E. Also the double peak of Mount Kogi (3,537 feet) to the N.W. of Mount D'Or, in one with the little Mount Io, on the west end of Du Bouzet Island, bearing N.E. $\frac{1}{2}$ N., or Freycinet Island (not very clearly distinguishable by a stranger, but lies to the N.W. of Du Bouzet Island). A small, round, and wooded dark islet should bear N.N.E. $\frac{3}{4}$ E., which bearing leads up to the north entrance, between the dangers within the reef.

The first is a coral patch lying on with the first leading mark or N.E. of the middle of the entrance; it should be left to starboard, passing nearer to the pyramid on Te Ndu on the port hand. The next a reef east two miles from the pyramid, nearly awash, but seldom shows, and therefore the more dangerous. The next, the Prony Reef, N.E. $\frac{1}{2}$ E. three miles from the pyramid, must also be left to port. These reefs are best seen and avoided by a look-out from aloft. It is H.W., F. & C., in Port Noumea at 8h. 25m.; springs rise four feet.

DUMBEA BAY is to the northward of Port Noumea, and separated from Port Laguerre to the westward by a mass of high land, remarkable from two high summits, whose southern face runs N.N.W. and S.S.E. They are called Gere, 1,266 feet high, and stand on the Mestro Peninsula.

On the western side of the bay is a creek or harbour with anchorage, at the head of which is a spring, which was found to be abundant after a long drought.

PORT LAGUERRE lies westward of Mestro Peninsula, sheltered from the S.W. by Jeanne d'Arc Islet (Te Ndu). From the south point of this a coral bank projects three-quarters of a mile to the S.E., does not always break, but is marked by the colour of the water. Its outer extremity is due south of the point which separates the mouths of the two rivers which enter the bay from the N.E. and N.W. The port is a mile in diameter, with good anchorage all over. The best in the triangle formed by the three points of the two rivers in $5\frac{1}{2}$ fathoms. Some coal deposits, which at some time may become important, lie up the river, running into Port Laguerre to the westward. This bay is readily arrived at by the Noumea Passage carefully conning from the mast-head.

UITOE PASSAGE, in latitude $22^{\circ} 10'$ S., is 14 miles N.W. $\frac{1}{2}$ W. from the Dumbea Passage. The coast within, north-westward of Port Laguerre, is lower; the high lands lie some distance inland. A sharp-pointed conical hill, the Titema Summit (1,174 feet) brought in one with the table-topped Mu Mountain (4,000 feet), N.E. $\frac{3}{4}$ E., leads through the passage, which is quite clear, and has 14 fathoms water. H.M.S. Nymph, 1878, says:—"Pilots report three fathoms upon the leading mark Mbou Island N.E. $\frac{1}{2}$ E., east end Matthew Isle N. $\frac{1}{2}$ W., about a quarter of a mile beyond turning point."

Port Uitoe, a basin sheltered by a line of low islands, lies westward of the Karikate Peak, a conical peak 768 feet high, and affords a large and well-sheltered anchorage.

Port St. Vincent is the next important place to the northwest.

Mathieu Island, in its south-west part, lies westward of Port Uitoe, with a hill on its west side, which falls nearly perpendicularly into the sea. Between this bluff and some islets is the southern entrance from the Uitoe Passage.

The port is chiefly sheltered by three islands, which lie N.N.W. and S.S.E. eight miles, with channels between. The southernmost is Hugon, $3\frac{1}{4}$ miles long, steep-to on its east and west sides; its northern, the shortest, is fronted by a coral and sandy strand. There are some springs 800 yards southward from its north point. Ducos Island is the largest. Its eastern point is a peninsula, joined by a low sandy neck, which forms excellent well-

sheltered bays on each side of it. That to the south-east is protected partly by Hugon Island. There is a shallow passage between these two islands. The bay on the north side nearly a mile deep, and 750 yards wide, with a depth of five to three fathoms, makes an excellent land-locked basin, where a vessel can leave down at all seasons. Off its entrance is Marceau Island. High water, 5h. 50m.; rise, $4\frac{1}{2}$ feet.

Between the north-west point of Ducos Island and the steep eastern end of the rugged Le Predour Island is the principal entrance to the port (Ducos Passage) not more than one-third of a mile in width, but with deep water. Within this the harbour extends eastward along the north side of Ducos Island; but its area near the land, and also in the Gulf of St. Denis eastward, is shoal water. The chart must furnish further instruction.

The St. Vincent Passage, through the outer reef, S.W. by W. from Ducos Passage, is wide and deep, and may be known by a sandy islet (Tenia), covered with shrubs, which stands on the outer reef at a mile north-west from the passage. It is subject to a ground swell. The entrance is in $22^{\circ} 2' S.$, $165^{\circ} 59' E.$ *

Uarai Passage, in $21^{\circ} 51\frac{1}{2}' S.$, $165^{\circ} 43' E.$, may be known by a sandy islet, with some bushes on the reef, about a mile from the south side. A mountain, with a table summit sloping to the South, bearing north, leads up to it. When made out, steer through towards Le Bris Island, like a large hill on the main, leaving it to starboard, and on to the Port, which runs N.W. by N. for about four miles, and a width of $1\frac{1}{2}$ miles, with a depth of from 14 abreast Le Bris Island to 3 fathoms $1\frac{1}{2}$ miles from its head, inside which it shoals. The anchorage is off a bight on its east side. Two buoys are marked on the chart off the edge of the entrance reef on the western side, and a beacon on the extreme of the reef extending southward from Le Bris Island. There is also a passage within the reef to Port St. Vincent. There is another opening through the reef three miles south-eastward of the Uarai Passage.

The Burai Passage, in lat $21^{\circ} 39' S.$, may be known by a long, low, sandy island inside the reef. The pass is very broad, and in a deep recess of the reef, which here approaches to about two miles of the coast. The pass runs north and south. There is good anchorage within, the best to the south-east, where there is a fine river.† There is a beche-de-mer establishment to the north-west. It is a fine anchorage at all seasons. The bight is about three miles deep.

Cape Goulvain, in lat. $21^{\circ} 33' S.$, is a prominent headland. The reef here is close to the mainland.

Contrariétés Island, a sandbank covered with bushes, is about 12 miles beyond Cape Goulvain. The reef here runs somewhat off the land. Seven and a half miles beyond this island is Moueo Passage, in $21^{\circ} 24' S.$, $164^{\circ} 57' E.$

The entrance lies W. by S. and E. by N., thence gradually turning northward. This bight is five miles deep, with anchorage at its head in five or six fathoms, mud, about three-quarters of a mile northward of Grimoult Island, off the north side of which is a 9-foot patch.

Puembut Passage, in $21^{\circ} 14' S.$, a mile broad, has a reef in its centre, southward of which is the best channel. Inside the channel extends three miles north-eastward, and eight miles northward between the reefs, where it joins the Koné Passage. Anchorage in three fathoms under the western side of an island a mile south-westward of Puembut River, eight miles up the channel, which is a mile wide up to this point, with least depth $4\frac{1}{2}$ fathoms. Koné Passage, eight miles to the northward of Puembut Passage, about half a mile wide in its entrance, extends five miles northward, with anchorage at its head.

Duroc Pass is in lat. $21^{\circ} S.$ Pouaco Village is six miles from the entrance; $2\frac{1}{2}$ miles south-eastward of it is a good anchorage.

* Captain H. Wilson says that on Pouen Island, about two miles north-west of the passage, sheep can be procured.

† Captain H. Wilson reports that oranges are being extensively grown here—information may be obtained at Noumea. There is an inside passage from Noumea to Port Burai, used by local coasters.

Alliance Cut, the next entrance northward, in $20^{\circ} 57'$, is very narrow.

Between lats. $20^{\circ} 45\frac{1}{2}'$ S. and $20^{\circ} 41'$ are two passages through the reef, that northward, the Koumac Passage; the southward, the Deverd Passage—which runs east and west toward Cape Deverd, remarkable for a pointed summit. There is anchorage under the north side of this headland, and a clear wide channel to it eight miles long from Deverd entrance.

Great Koumac Reef extends from Koumac Passage, 23 miles north-westward without an opening, and with lofty mountains abreast it. In $20^{\circ} 23\frac{1}{2}'$ S. is the Gazelle Passage, leading into Néhoué Bay. Cape Tonerre, E. $\frac{3}{4}$ N. 10 miles from this entrance, is about 350 feet high. Behind it is a plateau with two summits, forming a well-marked table-land 800 or 1,000 feet high. (See chart for approach to Néhoué Bay).

The best anchorage in Néhoué Bay is in its southern part, in five fathoms, at two cables eastward of the largest islet lying off the northern end of Cape Tonerre Peninsula, and two cables northward of a reef under water, which is always visible.

Tanlé Bay, two miles wide, is separated from Néhoué Bay by Boh Island; its anchorage is sheltered from the southward by Tanlé Island, lying westward of Boh Island. Bonn'mahame Reef, westward of Tanlé Island, forms the southern side of the entrance, and must be carefully avoided. The anchorage, in four fathoms, is northward of Observatory Hill at the eastern end of Tanlé Island, and affords security in the worst weather. It is high water at Tanlé at 8h. 4m.; springs rise five feet. From Tanlé Bay the high land of Bonne Peninsula extends for $4\frac{1}{2}$ miles north-westward to Poume Point. Its highest point is 1,468 feet high.

Poume Pass, in lat. $20^{\circ} 15'$ S., seven miles westward of Poume Point, $1\frac{1}{2}$ mile wide, may be entered by keeping that point or the pointed summit just northward of it, east by north. Great care is required in entering this passage, as the tide runs strongly. Flood E. by S. 2 knots; ebb W. by N. Within the reef the tide runs three knots, flood southward, ebb northward.

Banaré Bay lies five miles northward, with islands and anchorages in it. Off it lies Néba Island, two miles long, north-west and south-east, moderately high. There is anchorage half a mile off its western side in eight or nine fathoms sand. Two miles south of its south-east extremity is a two fathom patch, another of four fathoms lies north-west three miles from its north-west end, midway between it and the Yandé Island.

Yandé or Yendi Pass about a mile wide, in $20^{\circ} 5'$ S., $163^{\circ} 47'$ E., is entered by keeping the summit of Yandé Island (1,070 feet) north-east. Great caution must be used on account of the tides, which at time of change produce a sort of bore. Flood runs eastward and ebb westward three knots. Eight miles eastward of Yandé lies Paaba Island, five miles long, north and south, with islets extending three miles off its north-west side. The Belep Isles to the northward, consist of five islands and some rocks.

D'Entrecasteaux Reef—An immense range of dangers extends for 150 miles north-west of the north extreme of New Caledonia, probably separated into distinct portions. This dangerous and extensive reef, occupying a space of nearly 1,000 square miles, is an invisible coral reef, with only a few large rocks or stones on its margin; one of these on its north-west end is nearly 20 feet high. It has two openings on its western face, and one (?) on its eastern. This reef encloses four small islands, of about two or three miles in circuit, viz., North, Middle, and South Huon, with Surprise Island on its south extreme.

North Huon Island, in $18^{\circ} 2'$ S., has a safe anchorage from easterly winds; but should be carefully approached, having many coral patches two or three miles W.N.W. from it, which is the channel. The landing is good, on a steep sandy beach. It abounds with turtle and fish, but no water.

Middle Huon is safe of approach, but the anchorage is bad, and its fringe reef is dangerous for boats to cross. It is in $18^{\circ} 18' 37''$, and abounds with turtle, fish and landrail.

South Huon is still more dangerous of approach for boats than Middle Huon. It is about south four miles from Middle Huon.

Surprise Island is S.S.E. 26 miles from Middle Huon.

It was found that the west face of the reef forms two deep bights.

The north-west extreme may be known by several rocks 15 to 50 feet out of the water.

Captain D'Urville determined the position of the north extreme as follows:—North-east point, $17^{\circ} 59' 6''$ S., $162^{\circ} 55' 14''$ E.; the north-west point, $17^{\circ} 52' 40''$ S., $162^{\circ} 41' 47''$ E.

The North-east Coast of New Caledonia trends in a general direction for 210 miles. It has not been fully surveyed. It possesses the same dangerous character as the other side from its barren reefs, is a lee shore from the prevalent trade wind, and the northern portion is liable to cyclones, to which the portions south of lat. $21\frac{1}{2}^{\circ}$ do not appear to be liable. In navigating within the reefs a man aloft should be kept on the look-out for dangers. The depth between the reef and the shore varies from 49 to 22 fathoms.

Queen Charlotte Foreland, the south-east extreme, is fringed with the coral reef, and may be said to be limited to the north by the little harbour of Iate, an indifferent anchorage; it is a good place for heaving a vessel down, and has plenty of fresh water.

Kuebüni, eight miles south-eastward, is entered between the islands Nau and Nea. The anchorage, in 11 fathoms, is only suitable for large vessels as a stopping-place; care must be exercised in entering to avoid a danger lying in the channel. A dangerous $2\frac{1}{4}$ -fathom patch lies a mile N.N.E. from Kuebüni entrance.

Southward of Iate Passage the reef with $4\frac{3}{4}$ fathoms on it is three miles off the shore. North of Iate Passage the reef is shallower and awash in places for $2\frac{1}{2}$ miles; northward of this, between $22^{\circ} 5'$ and $22^{\circ} 1'$, the least depth is $3\frac{1}{4}$ fathoms. Thence to $21^{\circ} 18'$ S., the reef continues at a distance of seven miles off shore, with many openings through it.

Cape Coronation is ten miles from Iate Passage in $22^{\circ} 2'$ S. North of Cape Coronation is the small river Unia. Point Uinné, or Rencontre Bay, in $21^{\circ} 59'$ S, may be known by a large red vertical patch on the flank of the hill to the north. The anchorage is good. The land northward is irregular, and of a reddish tint.

On the northern side of Uinné Bay the land is 1,184 feet high; three miles northward of it is Kuakue Bay, one mile wide and one mile deep. Two patches of 2 and $1\frac{1}{2}$ fathoms lie $1\frac{1}{2}$ miles northward of its entrance. There is good anchorage in the head of this bay in 15 fathoms. Hence N. westward are numerous passages through the reef, for which see Chart.

Kundio River in $21^{\circ} 46\frac{1}{2}'$ S. has an anchorage off its mouth sheltered from the eastward by reefs. Between this river and Tupeti Island, six miles to the N.W., reefs extend to a distance of $3\frac{1}{2}$ miles from the shore, with a passage on either side of them, best understood from the chart. Tupeti Island is of a pyramidal form detached from the coast.

PORT BOUQUET extends $5\frac{1}{2}$ miles northward from Tupeti Island, to Nemmini Peninsula, 1,184 feet high, sheltered from the eastward by two reefs, with, in its centre, Nénou Island, $1\frac{1}{2}$ miles long, E. by N. and W. by S.

Tupeti Pass is two miles wide, with a dangerous sunken rock exactly in its centre. To enter southward of this rock, bring the southern extreme of Nemmini Peninsula S. $18\frac{1}{2}^{\circ}$ W. or the summit of Tupeti Island S. 25° E.; the northern of these courses will lead to the northern entrance of Port Bouquet, close round Nemmini Peninsula; and the southern will lead up to the southern entrance of the port, which passes close round the northern side of Tupeti Island; the central passage crosses the line of reefs north-east of the east end of Nénou Island.

Tehio Pass, $1\frac{1}{2}$ miles wide, in $21^{\circ} 31\frac{3}{4}'$ S.; is entered by bringing Bouataméré Rock, a high black rock covered with pines, to bear S. 30° W. Within the reefs flood runs north-west, ebb south-east.

NEKETE BAY. 20 miles beyond Port Bouquet, its entrance is two miles wide between the coast and a small island, Nani, on its northern side. It has good anchorage. The Nékéte Pass, half a mile wide, is entered by keeping Nani Island bearing S. 31° W.

Off the north end of Nani Island a reef extends nearly a mile, forming the eastern side of Lavassière Bay, $1\frac{1}{2}$ miles in diameter, with good anchorage in its southern part in 10 or 15 fathoms. Its entrance is only two cables wide, with a depth of 12 to 24 fathoms. Hence to Cape Dumoulin,

6½ miles, the shore has a line of reefs, the Bogota Reefs, running parallel with it at a distance of a mile. For the off-lying patches see chart.

Port Kanala, of which Cape Dumoulin forms the eastern entrance point, is probably the largest port on the east coast. The exterior reef is 4½ miles off shore at Kanala; there are several entrances through it. The harbour, 1¼ miles wide at its entrance, extends five miles S.S.E., with several good anchorages at its head.

PORT KUAUA, westward of Cape Bégat, which is five miles from Cape Dumoulin, is a good harbour, divided into inner and outer. There is a difficulty in entering with ordinary winds.

CAPE BOCAGE, in 21° 13' S., is composed of high perpendicular hills, visible at a great distance. It is one of the most projecting and distinctly marked points on the east coast of New Caledonia.

One-tree Island stands on the Barrier Reef to the south-east of the Uailu Pass, which is three miles broad and abrest Cape Bocage. There are several other passes hereabout. Cape Tuho is in 20° 48' S., off which is the wide Ti-ouaka Passage; the reef approaching the shore on each side. To the westward it runs out suddenly again to a distance of 10 miles off the shore.

YENGEN, or Ienghène.—For three miles before reaching Yengen (from One-tree Pass, the principal entrance) the coast assumes an extraordinary appearance, bordered by a range of perpendicular black rocks, nearly 1,000 feet high, rising into points as sharp as needles. Toward Yengen this range breaks into detached rocks (the Towers of Notre Dame), only one of which stands on the north side of the harbour, of which it is in fact the North Head. The entrance gradually shoals from 17 fathoms to 4. The inner anchorage is not so well sheltered as to be safe. Two large rivers enter the harbour.

CAPE COLNETT is readily known by the waterfalls to the north of it; the land is the highest in New Caledonia, the loftiest summit, Mount Douit, being over it. There is a sand islet off the cape with a deep water channel inside. The outer reef, which is entirely interrupted at Yengen, at Cape Colnett again appears near to land, and gradually increases in distance from it to the north. There are several passages (as shown by the chart), and 17 miles beyond Cape Colnett is that of Pouébo or Pusesepo, which has a southerly direction.

BALADE is 9½ miles beyond Pouébo. One necessary observation in making out the place is, that from Yengen there is no sandy beach visible from outside the outer reef until you come to Baladé, from which they extend to the west.

THE BALADE PASSAGE is half a mile wide. At two or three miles further west is a second passage, not very well known. From Balade Pass to the anchorage the distance is four miles; the best position is with the blockhouse bearing S. by W., and the old fort kept at a little distance to the left of the church.

Amoss Pass, three miles westward of Balade Pass, is about three-quarters of a mile wide; its entrance is found by bringing the summit of Paon Island to bear S. 69° W., and when up with the entrance, rounding the reef at a cable distance until the Blockhouse bears S. 29° E. Both passes require great caution on account of the currents. The flood running into these passages divides into two streams when within the entrances.

Water is easily procured at the mission, and is good. There are two species of fish, the one red, the other like a sardine—are very poisonous. It is best to consult the natives before using any caught here.

It is H.W., F. & C., at 6h. 15m.; spring range from 3 feet 6 inches to 4 feet 3 inches.

The Diahot River, 80 miles long, enters the sea in Harcourt Bay, 10 miles westward of Balade, from which it is reached by a good channel, and is of increasing interest on account of the recent discoveries of gold on its banks. The navigable portion extends from Pam Isle at the entrance to Bondé, a distance of 25 miles. At its mouth the river is three-quarters of a mile wide, gradually decreasing till at Bondé it is 125 yards wide. Thirteen miles up are the mines of Mouendine or Manghine. The navigable portion of the river consists of deep channels, separated by moving sandbanks.

In the eastern part of Harcourt Bay is excellent anchorage, near Pam

Isle, on its eastern or western sides. The bottom is of white sand, and good holding ground.

Balabio Island, off the N.W. point of New Caledonia, is not very well known. There are some channels within the reef leading to the N.W. through De Varenne Strait, and round the north end of the island to the openings through the reef on its eastern side.

There is considerable trade between New Caledonia and Auckland, whose timber, potatoes, etc., are largely imported. Situated on the edge of the tropics its productions will naturally be varied when cultivated to any extent, including sugar, coffee, oranges, etc.

THE LOYALTY ISLANDS

may be considered part of the New Caledonia Group, running parallel with the trend of that island, at a distance of 50 to 60 miles, and consist of three principal islands, Maré, Lifu, and Uea; between the former two are five smaller islets.

Mare, or Britannia Island.—Cape Coster, the N.E. point, is in $21^{\circ} 29' S.$, $168^{\circ} 6' E.$ The eastern side of the island runs nearly north and south 12 miles, a steep cliff, with a narrow beach. Cape Roussin, on the north coast, is separated from Cape Coster by an extensive bay. The northern side of the island is a deep bay, having Cape Mackau at its west extremity. Cape Coster is a peninsula, surrounded by breakers at a short distance. Off Cape Mackau is a small island, Molard Island, about three miles in circuit.

The anchorage is on the north side between Cape Roussin and Mackau, to the westward of some perpendicular white cliffs. Off the north shore of Maré Island there are several coral patches and knolls, with apparently two to five fathoms water over them, lying about three-quarters of a mile from the beach, with the church bearing S.W. by S.

Tandine or Undine Bay appears to afford the only anchorage on the west side of Maré Island; the bay, about two miles across, recedes to the north-eastward from Castle Point, and when well open a large white house will be seen north of a grove of coconut trees.

North-westward, besides Molard Island, are three other small islands, Hamelin, Laine, and Vauvilliers. East of these is a fourth, Boucher Isle, or Teka, eight or ten miles in circuit.*

Lifu, or Chabrol, the island next to the N.W., is a coral island, 100 to 250 feet high, level at the top, with perpendicular cliffs, steep-to, except at some of the points, off which ledges extend. Its S.E. point, Cape Pines, is a projecting promontory, crowned with a mass of pine trees. At five or six miles north-east of it, and beyond Point Daussy, is a large and deep bay, Chateaubriand Bay, exposed to the prevalent winds. At Cape Bernardin, the north-east point, the coast trends westward, perpendicular and wild-looking to Cape Escarpé, the north point; W.S. Westward of it, six miles, and $2\frac{1}{2}$ off Aimé-Martin Point is a dangerous reef, a mile in length and half a mile broad.

The west coast of Lifu is nearly perpendicular in most parts.

Wide or Sandal Bay is a considerable inlet on the north-west coast. It lies between Lefebvre and Aimé-Martin Points, 10 miles apart. At $1\frac{1}{2}$ or two miles eastward of the south point is a high, perpendicular reddish cliff, covered with pine trees; on the space between these capes is the dangerous Selter Bank, about two miles off shore, between one of these capes and the high hill on the north side, over Morne Bay. In beating into Sandal Bay do not pass beyond the line of this hill in one with the white sandy beach near the north-west part of the bay. In its south-east part, near the sandy beach of Kyjah or Caidja, is a small detached islet, near which is a bank deep

* H.M.S. Renard, 1878, reports:—Tiger (Teká) Island is in $167^{\circ} 57\frac{1}{2}' E.$, or about $5'$ East of the position on chart. Molard Island and Markau Point (N.W. point of Maré) are also a corresponding distance too far East (and probably the whole position of Maré). From hydrographical notes by the Commodore in 1875 Tíga is placed $6'$ too far east on chart, and Maré $4\frac{1}{2}'$ too far west. Off the north shore of Maré is a number of patches with apparently two to five fathoms on them.

enough to anchor on if necessary, with Cape Lefebvre bearing S. 80° W. Morne Bay, or Uacho, is a slight indentation in the north-east part of the bay. Nearly in its centre is a large black rock on the beach—the Tower. There is anchorage either to the east or west of this rock. The eastern anchorage is, with the Bluff (Le Morne) S. 84° W., and Tower Rock N. 26° W. The western anchorage is only fit for small vessels.

No part of the bay is safe during the hurricane months, from December till the end of March. Fresh water is very scarce.

Uea, or Halgan, separated from Lifu by a channel 20 miles broad, is a narrow belt of raised coral, extending 23 miles from S. by W. to N. by E., with a breadth in the middle of $1\frac{1}{2}$ miles, and at the north and south parts seven or eight miles. Towards the west a chain of islets, the Pleiades, extend in a circle from the north to the south end of the island, encircling a lagoon of 12 or 15 miles in diameter, Bishop Sound, in which are several anchorages reached by the passages between these coral islets. The village of Idgawee and a mission station are on the south-east side of this bay; the village of Achir is on the north-east side. It is the only one of the Loyalty Group which affords safe shelter.

THE NORTHERN PASSAGES.—The first islet of the Pleiades resembles a ruined tower. There is no passage on either side of this. The next islet is called La Baleine (Whale) or Isénay. Between Whale and Turtle islets is the Whale Pass, narrow, but deep, and running to S.S.E.

The Bull Entrance, the great N.W. Pass, is between the fifth (Pine) and the following islet (Olo), nearly a mile wide, with 12 fathoms water, in a S.E. by E. direction.

The southern entrances are in some degree preferable, from the wind being more favourable. The Styx Passage is taken by approaching (not too near) the south point of Mouli or Badeneu Island, and then steering, at three-quarters or one mile off shore, to W. by N. for two miles, when the entrance will be found between the third and fourth islet. It is broad and safe, running to N. and N. by E. The broad pass of Ancmata is further west. From this entrance to the Catholic mission there is a clear passage. The church may be seen from afar. The best anchorage is near Faiaone, or Sandalwood Wells, in $4\frac{1}{2}$ fathoms, with the chief's house S.S.E. Uea is the most fertile of the group; poultry and pigs may be procured, but good water is scarce.

THE BEAUPRE ISLANDS lie some six leagues north-westward of the north-west part of Uea. They consist of several small low islands, covered with cocoa-nut trees, and surrounded by a coral reef, which extends from the islands some distance to the north-west and north.

The Astrolabe Reefs are some 30 miles north-westward from Beupré Islands, and 60 miles from the nearest point of New Caledonia, lying in a nearly east and W. direction. The southernmost of them may be about five or six miles long. At the north extremity is a sandy islet, nearly level with the water. The northernmost of these reefs is four leagues distant from the other, and about the same in length (chart). The north point is in lat. 19° 14' 20", long. 165° 26' 24" E. They are placed in the chart between the parallels of 19° 49' and 19° 57' S., and 165° 15' and 165° 50' E.

PETRIE REEF is about $5\frac{1}{2}$ miles long, north and south, and three miles broad. On the north-west side is an opening, about two miles wide, leading into a lagoon with apparently deep water. On its west and south-east sides are sand banks 20 to 25 feet. Off the north extremity a strong tide rip was observed, the stream setting to the north-east. The north point of Petrie Reef is placed in 18° 31' S., 164° 26' E.

THE LOW ARCHIPELAGO, OR PAUMOTU GROUP.

This group is too extensive to come within the scope of this work, and as Tahiti has first to be visited (see page 223) the necessary information, pilot, &c., can be obtained there. The chief trade is in copra, beche-de-mer, turtle, &c.

SOCIETY ISLANDS (FRENCH).

The ports open to foreign commerce at Tahiti and its dependencies are Papiete and Toanoa at Tahiti, and Papetoai at Moorea or Eimeo. Foreign ships are authorised to proceed from Papiete or Toanoa to Papetoai, and *vice versa*, for the purpose of effecting their landing. No foreign-going ship may, unless by special permission or a case of necessity, anchor in any of the ports of the islands subject to the French Protectorate besides those mentioned above. The coasting trade is exclusively reserved to vessels carrying the French or the Protectoral (Tahitian) flag. At Papiete licenses are issued to foreign vessels to load oranges for exportation in other ports of Tahiti and Moorea. Practically the coasting trade is carried on by Tahitian vessels. Exports—Cotton, copra, cocoa-nut oil, pearl shells, fungus and oranges.

The year may be thus divided:—1. The season of south-east winds, May to August. 2. Of easterly winds, from September to November, and part of December, which is the finest season of the year. 3. The bad or rainy season, from the middle of December to March or April.

The south-east trade-winds, on reaching Tahiti, are divided into two branches by the peninsula of Taiarapu and the mountains, of which that passing to the north east blows regularly, but that which continues along the south-west is impeded by the island of Eimeo, and deflected by it towards Tahiti, reaching it as a south-west, or west, or even as a north-west wind, according to the force of the trade. This must be taken into consideration in making Papiete.

The extent of the zone of calms, caused by the mountains, varies in different parts of the day, and with the strength of the breeze.

The TIDES are inconsiderable.

Maitea, or Osnaburgh Island, the easternmost of the group, is 1,597 feet high, round, and not over seven miles in extent. Its north side is remarkably steep. On the south side the declivity is more gradual. Near the east end are two remarkable rocks, and a reef runs off eastward half a league.

It is in $17^{\circ} 53'$, $148^{\circ} 5' E$.

Tahiti, 32 miles long from north-west to south-east, is an elongated range of high land, interrupted by an isthmus three miles broad. The land rises to a considerable height on both extremities of the island. The loftiest mountain, in the northern peninsula, Orohena, is 7,339 feet high.

Outside the low belt of land at the foot of the mountains, a coral reef encircles the island at the distance of two or three miles, and within this are several excellent harbours, but the best and only one used is Matavai Bay on the north side.

Point Venus is the northern point of Tahiti. There is a small church and a fort on the point; the coral reef extends one-third of a mile off.

The **LIGHTHOUSE** is a square white tower, 72 feet high; from it is shown a *fixed white light*, 82 feet above the sea, visible 15 miles.

Artémise Bank lies $E \frac{3}{4} S.$, nine miles, from Venus Point light. From the South or S.E., on opening the light, a vessel should not steer West of North until the light bears S.W. by W. $\frac{1}{4} W.$, when she may alter course to West, passing northward of all dangers. A good day mark is Eimeo open of Point Venus.

Matavai Bay lies westward of Point Venus. West of the point is the Dolphin Bank, separated from it by a very narrow channel; this bank has only 13 feet on it in places. The S.W. limit of the bay at Tahara, or West Bluff, surmounted by One Tree Hill, is a mile from Point Venus. Some detached spots lie off the West Bluff, and northward of Dolphin Bank, with 18 and 20 feet water on them. One, Banana Reef; another Pooreo Reef.

PAPAWA HARBOUR, one mile long E. and W., is a mile W.S.W. of West Bluff, formed seaward by the line of shore reef, just level with the water. Outside it the water is unfathomable. The village lines the shore.

Toanoa Harbour adjoins it on the West, its entrance formed by an opening in the outer reef.

In clear weather the mountains of Otaheite may be seen 90 miles. The ports most frequented are on the north side, and may be approached without difficulty when the trade wind is blowing. Sometimes in the winter months the trade wind is interrupted by breezes from N.W. and W., and at others calm and unsettled weather prevail. At such times avoid getting into the bay between Otaheite and Tiarrabou (the lesser peninsula), especially on the S.W. side of the island; the swell rolls in heavily on the shore, and there is no anchorage.

Matavai Bay may be considered a safe anchorage from April to December; during the rest of the year the trade is liable to interruptions from westerly winds, which blow directly into Matavai, and occasion a high sea. The anchorage is protected by Point Venus and the Dolphin Shoal. Between it and Point Venus is a channel 50 yards wide, with 17 to 10 fathoms close to the reef; and by anchoring a boat on the edge of the shoal a vessel may enter with perfect safety, provided the breeze be fair. It is, however, better to pass southward of the bank, and haul round towards the anchorage, taking care not to get to leeward, so as to bring the north-east bluff of One-tree Hill to bear southward of south-east, as there are coral banks in that direction. Anchor in $8\frac{1}{2}$ or 9 fathoms, mud, taking care of the reef that lies off the shore.

Westward of Matavai are three good harbours, Papawa, Toanoa, and Papiete, the latter the largest and most frequented. The entrances to all are extremely narrow; a stranger should take a *proper* pilot.

Toanoa, four miles west of Matavai, may be known by a remarkable rugged mountain, seen through a deep valley when abreast it. The channel into Toanoa is 330 yards wide; off the eastern side of the passage is a rock, which sometimes breaks, lying north-west 60 fathoms from the breakers, and another on the inner side of the opposite reef; neither, however, narrow the channel much, and are only dangerous if the wind breaks the ship off, or in rounding the reefs closely. With a fine wind keep mid-channel, and clewing all up, allow the ship to shoot into a berth, two cables from the shore, in 13 or 14 fathoms. Here she must wait till the wind falls, and then warp or tow into the inner harbour. Further information cannot here be given.

Papiete is two miles westward of Toanoa. The entrance, only 320 feet in the clear, has a bar with $4\frac{1}{2}$ fathoms on it. The current here sets out strong, in blowing weather the sea breaks quite across. A pilot is necessary for this port, and boats should be ready to tow or run out kedges as required, whether the pilot advises or not. By night the entrance is marked by two *red lights* in one, bearing E.S.E. (These lights cannot be depended on.) After the entrance is passed, steer S. by E. $\frac{3}{4}$ E., until the first rock on the inside, bearing S.E. by S., $\frac{1}{3}$ of a mile from the eastern dry reef is passed; then haul towards the missionary church, and beat up the anchorage between that shore, which may be approached within half a cable, and the reefs which extend from the Low Island towards the south-west. There is a flagstaff on its south point. These reefs will be seen, and may be approached as close as convenient. Another rock lies S. $\frac{1}{4}$ W., 2,000 feet from the entrance; but with the trade wind this will be weathered. Papiete is subject to calms and hot weather, being rather to leeward.

The tides in these harbours are irregular. It is generally high water half an hour after noon every day, and low water at six in the morning, but only varies about a foot.

The patent slip at Papiete will take a vessel of 600 tons, the heaving down quay being adapted to careening vessels of a far larger size. Fresh water of a good quality can be got free of charge at the watering quay. Fresh provisions, stores, and supplies of various kinds can be procured, but the price is large.

A vessel from the east finding that the eastern breeze does not reach Papiete should bear towards Moorea, and then approach Papiete on a south-east course. Otherwise this failure of the wind might be dangerous in causing the ship to be drifted on to the reef. If the east or north-east wind is well established, it may be better to enter by the Tau-Noa channel to the north-east, but under the pilot's direction. In leaving it is better to pass

north of Moorea, to get in the true trade, and to avoid the calms and uncertain breezes.

The N.E. reef extends from $1\frac{1}{2}$ mile E. by E. $\frac{1}{2}$ N. of Point Venus, 10 miles to the first valley eastward of it. This reef is detached, and parallel to the coast, except near its centre, where it trends N.N.E. for a quarter of a mile. The channel between this and the reef southward is abreast this valley (Hapaina), and two miles wide. To avoid this reef a ship from the eastward, when within ten miles of Port Venus, ought not to bring that point westward of W.S.W. Between the reef and shore the passage is good, but leads to neither harbour nor shelter, and ought to be avoided. This reef seldom, if ever, breaks, is from one-quarter to three-quarters of a mile wide; least water, three fathoms.

This reef and the following have not been laid down on any chart, and therefore very liable to mislead a stranger.

The eastern reef off Tahiti (off the Valley of Teallay) is more dangerous than the former, being hid from Point Venus. Vessels making that part of the coast almost invariably stand in-shore, and by keeping too close in would, in all probability, get within this reef, as it does not break. The outer part is from $2\frac{3}{4}$ to 3 miles off shore. The depths are regular, 4 to 12 fathoms. It is from three-quarters of a mile to a mile wide, and lies parallel to the shore. A ship may enter within this reef, as there is deep water at either end. It is five miles long, and detached.

Tetuaroa, a group of small low islets, about 6 miles long, enclosed in a reef, lie eight leagues N. $\frac{1}{2}$ W. from Point Venus. They abound in coconuts and fish. Its south-east point is in $17^{\circ} 2' S.$, $149^{\circ} 47' W.$

Eimeo.—The distance between the reefs of Tahiti and Eimeo is some 10 miles. This passage requires to be used with caution, as vessels have been becalmed for days in it while a steady breeze prevailed outside. The only winds which blow through and may relied on are north-east and south-west. The westerly current striking the eastern shore of Eimeo is turned eastward, and reaches the western shore of Tahiti. Steam-vessels should sight Point Venus light before passing to the eastward.

The mountains rise precipitously from the water to the height of 2,500 feet. The reef which surrounds the island is similar to that of Tahiti.

Coffee, cotton, sugar, and all tropical plants, succeed well at Eimeo. Sugar is made to a considerable extent.

Talu Harbour, on the north side of Eimeo, penetrates the island for two or three miles in a southerly direction, enclosed by precipitous sides, rising in places to the height of 2,000 feet. At its head is an extensive flat. "For security and goodness of its bottom it is not inferior to any harbour that I have met with at any of the islands in this ocean; and it has this advantage over most of them, that a ship can sail in and out with the reigning trade-wind, so that access and recess are equally easy. Several rivulets fall into it. One at the head admits boats to go a quarter of a mile up, where we found the water perfectly fresh."—CAPTAIN COOK.

The entrance is between two reefs. The only danger not above water lies on the port hand going in. The land wind blows out generally strong.

PARAU-ROA HARBOUR.—On the same side of the island, about two miles eastward, is Parau-roa, much larger within than that of Talu; but the entrance or opening in the reef (for the whole island is surrounded by a reef) is considerably narrower, and lies to leeward of the harbour. It is seldom visited, and its surplus produce is carried to Tahiti for sale. The perforated peak, 4,041 feet high is in $17^{\circ} 30' S.$, $149^{\circ} 47' W.$

Tapamanoa, or Saunders's Island, is six miles in length east and west. In the centre a mountain with a double peak rises; the lower ground abounds with cocoa-nut trees. The island was formerly celebrated for its yams. The north point is in $17^{\circ} 38' 41'' S.$, $150^{\circ} 43' W.$: by Hyd. Notes $150^{\circ} 36' W.$

Huaheine is 20 miles in circuit, divided into two peninsulas, Huaheine-Nui and Huaheine-Iti. The isthmus connecting them is overflowed at high water. In some parts coffee thrives.

Owharre Harbour is at the north-west end of the island. Run round the

north end of the island, which is clear, and you are off the entrance. Shoot up as far as you can if the wind is scant, anchor and warp in. There is another entrance more southward, marked by a small woody kay. Owharre Harbour lies in $16^{\circ} 43'$, $151^{\circ} 7' W$.

Raiatea, or Ulietea, lies seven leagues westward of Huaheine. It is 40 miles in circuit, of a mountainous character. At the distance of $1\frac{1}{2}$ or 2 miles from the shore it is encircled by a reef that includes the adjacent island of Taha.

UTUROA HARBOUR on the east side is a reef harbour, and has two or three entrances. From Huaheine steer across for the bluff, northern extreme of Raiatea, and you will come to two islets, between which is the passage. If bound to leeward, it is usual to run out through a passage to leeward of the island, keeping round inside the reefs; to do this you must be able to lay up south on the port tack. The wharf is in $16^{\circ} 50' S$, $151^{\circ} 24' W$. Captain Worth, R.N., says the best anchorage amongst the islands is at Raiatea, as there is both good entrance and exit, always capable of being taken, the wind blowing directly through. The only disadvantage is the depth of water, about 18 to 24 fathoms. The holding ground is very good. Fresh meat, vegetables, fish, and water can be procured here.

Ohamaneno Harbour is on the N.W. side of Raiatea. The entrance, between two sand islands, is a quarter of a mile broad.

Tahaa, or Otaha, northward of Raiatea, is separated by a channel of not over two miles wide; the space between them enclosed by the reef forms a beautiful sound. It is surrounded by a number of small islands, encumbered with reefs. There are several harbours within.

Bola-Bola, or Bora-Bora, is $4\frac{1}{2}$ leagues N.W. of Tahaa; the reef which surrounds it is nearly full of islets. It has but one harbour. It is distinguished by a lofty, double-peaked mountain in its centre.

Otea-vanna Harbour on the west side is well sheltered, and spacious; the depth is 25 fathoms, good holding ground, but the entrance has a rocky bottom. Captain Worth, of H.M.S. Calypso, says:—"The anchorage at Bora-Bora is difficult, as you are obliged to shorten sail between the points forming the entrance, and shoot up as far as the ship's way will allow, and then anchor, the wind always blowing directly out; it is then necessary to kedge up to the head of the harbour, where you may generally be able to make sail to the anchorage off the settlement. It is advisable to enter before noon, as the water appears to be still, and at times setting in until noon, when it recedes, the strength of the current being determined by the body of water thrown inside the reef. The reef stretches to the S.E., nearly $3\frac{1}{2}$ miles, making a very dangerous spit, particularly coming from Raiatea, as it is in the route to the harbour of Bora-Bora." Otea-vanna is in $16^{\circ} 32' S$, $151^{\circ} 46' W$.

Maupiti, the westernmost of the group, is six miles in circuit, and its highest point nearly 800 feet high. It is 40 miles N.W. of Raiatea, surrounded by a barrier reef, at a distance of three miles; the lagoon is too shallow to admit vessels exceeding 150 tons. This island, little frequented by foreign vessels, is in $16^{\circ} 26' S$, $152^{\circ} 12' W$.

Tubai, or Motu-Iti, the northernmost of this group, consists of some very small low islets, connected by a reef, about 10 miles north of Bora-Bora. It abounded with turtle. The north point of the reef is in $16^{\circ} 11' S$, $151^{\circ} 48' W$.

ISLANDS BETWEEN LATITUDES 10° AND 20° SOUTH.

Flints' Island, in $11^{\circ} 25' 43'' S$, $151^{\circ} 48' W$, is only $1\frac{1}{2}$ mile long from N.N.W. to S.S.W., and thickly wooded; high breakers extend off its point for some distance, the surf too high for landing. The current sets westward. Said to be guano here.

Vostock, or Wostock Island, is in $10^{\circ} 5' S$, $152^{\circ} 23' W$. It is a low, sandy islet, with a lagoon, well wooded, half a mile in diameter, of an oval shape, with heavy breakers surrounding it.

Mopelia Island (Mopihá) according to Wallis is 10 miles long and

four miles broad. Cook's position is $16^{\circ} 46' S.$, $154^{\circ} 8' W.$ According to Commander Hammond, of H.M.S. Salamander, $16^{\circ} 50'$, $154^{\circ} 21' W.$

Bellingshausen Island. — Captain Kotzebue gives its position $15^{\circ} 48' S.$, $154^{\circ} 30' W.$ It is a low, coral island, uninhabited, of a triangular form, covered with vegetation. Birds are very abundant and very tame. There is no opening into the lagoon, but the tide flows into it over the reef.

Scilly Islands form a group of small islands, which, being very low, are exceedingly dangerous. Captain Wallis places them in $16^{\circ} 28' S.$, $155^{\circ} 30' W.$,* but various sources place them in $154^{\circ} 50' W.$

Reirson Island (Rokabanga) lies about 20 miles N.N.W. of Humphrey Island, and is about half its size. Landing is not good here, but can generally be effected in a whale boat, with the assistance of the natives, about one-third of a mile northward of the village on its S.W. side. There are large quantities of copra and cocoa nuts. Fine mats and hats resembling Panama are made here. No anchorage.† The position is $10^{\circ} 2' S.$, $161^{\circ} 5' 30'' W.$

Humphrey Island (Manahiki), no anchorage, is a coral lagoon island of triangular shape, with its apex north, six miles long by five miles greatest width, low, and produces in abundance coconuts (oil and copra), pearl shell and beche-de-mer. The island is visible 12 miles. The village is on the west side of the island. There is no entrance into the lagoon, but fair landing with a whale boat on the N.W. side, close to the village, except from January to April, when westerly winds and unsettled weather prevail. There is an anchorage off the boat landing during the S.E. trades one cable off the reef in seven fathoms; there is a constant offset from the reef. The north point of the island is in $10^{\circ} 20' 30'' S.$, $161^{\circ} 1' 12'' W.$

Soworoff, a group of islets, two of which are about $1\frac{1}{2}$ miles long, covered with trees, lie in $13^{\circ} 13' S.$, $163^{\circ} 31' W.$, surrounded by an extensive reef nearly half a mile wide, which encloses a lagoon 12 miles by 8, with an entrance facing the N.E., half a mile wide in its narrowest part, with two patches in its middle which may be passed on either side, the depth in entrance being eight to five fathoms. The usual anchorage is on the south side of the first islet to the westward going in in five fathoms, one cable off shore, abreast a wharf. The lagoon abounds in beche-de-mer and fine pearl shell. Water may be obtained in small quantities by digging in the sand, and occasionally in cavities on the top of the reefs. The entrance passage runs about N.N.E. and S.S.W.; the usual trade is therefore a leading wind. It is reported to be out of the usual track of hurricanes. The chart shows a light on them, but it is only shown when a vessel is off or expected.

Danger Isles, consisting of three islands and surrounding reefs, are comprised within the limits of $10^{\circ} 48'$ and $10^{\circ} 56' S.$, and extend east and west for 10 miles. Puka-puka, the northernmost island, is about two miles north-west in length, as is also Koko Island, distant about four miles in a S.S.E. direction. The third and smallest island, Ratoe, lies about three miles S.S.W. from the south end of Puka-puka, and two miles north-west from the western extremity of Koko Island. These islands are connected by a submarine causeway, on the western part of which the barque John Williams was wrecked in 1864, by a drift setting westward four miles an hour. These islands produce coconuts (copra) and beche-de-mer, also fine pearl oysters. There is also some large and valuable timber. In the fine weather or trade season traders can secure to the reef in day time in a bight on lee side of island.

Within the line of reefs is a lagoon, and from the west end of Ratoe a ledge of reefs runs W. $\frac{1}{2}$ N. for $4\frac{1}{2}$ miles, marked near its western extremity by a narrow sandbank, half a mile long. The north-west part of Puka-puka is in $10^{\circ} 49' S.$, $165^{\circ} 51' W.$

* The Peregrino Island in $10^{\circ} 35' S.$, $160^{\circ} 40' W.$; about 80 miles S.E. of Manahiki; is in form of a horseshoe, with safe anchorage to the west. It is nine miles in circuit, uninhabited, and covered with valuable timber.

† There is said to be an anchoring place for traders, close in, on N.W. side of island.

Tema Reef, lying in a south-east direction from the Danger Isles, appeared to be about three-quarters of a mile in circuit. Nothing was visible excepting heavy breakers. It is in $11^{\circ} 6' S.$, $165^{\circ} 37' W.$

Nassau Island is about 50 feet high, the shape of an equilateral triangle, each side being about $1\frac{1}{2}$ miles long. No outlying dangers, beyond the fringe reef, were seen. It is uninhabited. Cotton and cocoanut have been planted here, and now grow wild. Large numbers of turtle are found. It is said to have fresh water. It is placed in $11^{\circ} 32' S.$, $165^{\circ} 24' W.$

Swain's Island, or Gente Hormosa, in $11^{\circ} 5' S.$, $170^{\circ} 55' W.$, is of coral formation, nearly round, and four miles in circumference. It is 15 to 25 feet above the level of the sea, which breaks constantly on all parts. "Can anchor close in, but not recommended. Trade principally with the Germans."—OHLSON.

SAMOA OR NAVIGATORS' ISLANDS

Lie between $13\frac{1}{2}^{\circ}$ and $14\frac{1}{2}^{\circ} S.$, 168° and $173^{\circ} W.$, and consist of four principal islands and five smaller. Earthquakes are not unfrequent, but do little or no damage. The productions are copra, cocoanut oil, arrowroot, coffee, and sugar, and the usual tropical fruits. Abundant supplies of wood, water, and provisions of the usual kind can be obtained.

The climate may be termed variable. The south-east trades are steady from May to November; for the rest of the year they are frequently interrupted by northerly and westerly gales, with heavy rain, thunder, and lightning. Destructive hurricanes occur, although not very frequently at Samoa, but probably so between them and the Friendly Islands, where scarcely a season passes without some of the islands suffering. It would therefore be advisable for whaling ships to avoid cruising in the neighbourhood of these groups from the middle of December to the end of April.

The flood tide sets westward; beyond its influence, on the southern side of the islands, a current generally prevails to the eastward, while it runs westward on the northern side. Vessels, therefore, should work to windward on the southern side of the group, where there is a favourable current, the winds more regular, and calms less frequent.

Rose Island, the easternmost of the Samoan group, is dangerous, from its low elevation (30 feet). It is S. 88° E. 78 miles from Manua. It is a low, small, annular coral island, inundated at high water, with the exception of two small banks, one of which is covered with trees. There is an entrance into its lagoon on the north-west side (chart). The tide rises $4\frac{1}{2}$ feet, the flood sets north-east, ebb south-west. In stormy weather the sea must make a complete breach over the reef.

The reef extends more than two miles to the W.S.W. It is in $14^{\circ} 32' S.$, $168^{\circ} 9' W.$

The Manua group consists of Manua-tele or Tau, Ofu, and Olosigna.

Manua, or Manua-tele, the easternmost, has the form of a dome, rising precipitously from the water to the height of 300 or 400 feet, then more gently to 2,500 feet. It is 16 miles in circuit. The principal settlement—Tau—is on the north-west side; there is anchorage near the shore, with a cove to land in; between the two heads the depth is 34 fathoms. Landing is not easy for boats, on account of the coral patches. The tide runs about six feet. With the trade wind vessels may anchor off the village of Feleasau (see plan), in a small bay east of the north-west point of the island, but prepared to weigh on any change of wind. The landing place (for boats), a narrow passage through the reef, is dangerous if there is much swell.

Olosinga, three miles long, is a narrow ledge; the rocks rise nearly perpendicular on both sides. The landing place is difficult at low water, on account of the fringing reef.

Ofu, westward of Olosinga, with a passage for boats of a quarter of a mile between, and anchorage on the western side. There is a small low islet off its western end, near which is an anchorage.

Tutuila is high, broken, 17 miles long and 5 miles wide. Its highest

peak—Matafoa—is 2,327 feet high. The spurs and ridges are precipitous, sharp-edged, and frequently rise from the water to the height of 300 or 400 feet, showing the bare basaltic rock. Above this height the surface is covered with vegetation. It has many ports or bays on its north side, where vessels may obtain wood, water, and supplies. The best and safest—Pago-Pago—is on its south side.

PAGO-PAGO HARBOUR is easy of access, its entrance, about a third of a mile wide, is well marked by the Tower Rock and Devil's Point, and lies between two hills—that on the west conical, that on the east square or elliptical. The shore reefs extend 100 to 200 yards from the beach, perpendicular or shelving on their outer edge, and awash at low water. The surf breaks over them at all times, distinctly marking their outline.

Taema Bank, off the entrance of Pago-pago, is three miles long east and west, and one-half to a mile wide; the western extremity bearing S. by E. from Breaker Point, $1\frac{1}{2}$ miles, has the least water ($4\frac{1}{2}$ fathoms) on which the sea breaks in bad weather. It is the only danger outside the shore reefs.

Nafanua Bank commences $1\frac{1}{2}$ miles north of the eastern end of Taema Bank, and extends E. by N. $\frac{1}{2}$ N. three miles to the south-west end of Anuu Island, from a quarter to half a mile wide, and from 8 to 26 fathoms water, irregular bottom. Steamers from the northward should use the channel between Anuu Island (and these banks) and Tutuila, it being half a mile wide and clear of danger. Breaker Point, W. by N. $\frac{1}{2}$ N., leads through. Taema Bank should be avoided, even in fine weather, by vessels drawing over 12 feet.

Whale and Grampus Rocks are the only hidden dangers inside the entrance. Whale Rock, 100 feet in diameter, has eight feet on it at low tide, with 18 to 25 fathoms around it. A black cask buoy is placed 60 feet east of the rock in 23 fathoms. The sea only breaks in bad weather, otherwise it is not easily seen. There is a passage, one cable wide, between the rock and Blunt Point, with from 25 to 30 fathoms water. Grampus Rock, N.N.E. $\frac{1}{2}$ E., three cables from Whale Rock, is 60 feet in diameter; with eight feet on it at low tide, and 23 to 25 fathoms water in the channel. A red cask buoy is placed 60 feet southward of the rock in 25 fathoms. A sunken rock N.N.W. $\frac{1}{4}$ W., $4\frac{1}{2}$ cables from Grampus Rock, is well marked by the break on it.

The Pilot lives on Anuu, and if the signal is made will board the vessel in the channel, or abreast the island outside.

SUPPLIES.—Wood and water can be had. Fruits, such as bananas, oranges, pine-apples, cocoa-nuts, and plaintains, are plentiful. Yams, taro, and bread-fruit can be procured in small quantities.

DIRECTIONS.—Having entered midway between Anuu and Red Point, keep Tower Rock a little on the starboard bow until up with Breaker Point; then haul in, giving the point a berth of one cable, when bearing E.N.E., steer N.N.W. $\frac{1}{2}$ W. $2\frac{1}{2}$ cables until Blunt Point bears west, when the northern side of Whale Rock will be in line with it, and distant $1\frac{1}{2}$ cable; then steer N.W. $\frac{1}{4}$ N., keeping the village of Leloaloe a little on starboard bow, avoiding the reef off Goat Island, until the inner bay is open W. $\frac{1}{2}$ S., thence in mid-channel. Good anchorage anywhere in the inner harbour, in 6 to 25 fathoms, blue mud and sand, excellent holding ground. Under 16 fathoms the harbour becomes narrow for large ships to swing at single anchor.

Sailing vessels experience no difficulty entering, as the trades blow directly in. A good working ship may beat out against the trades, but it is generally preferable to go out with the land breeze, from 2h. to 5h. or 6h. a.m.; the only difficulty is the liability of losing it before getting sufficiently clear of Breaker Point to allow a vessel to wait for the trade wind. The surf always breaks heavily on Breaker Point and on the reef outside of Point Distress; if a vessel loses the wind before getting clear of these points she had better anchor at once.

From November to May, westerly winds are frequent, then sailing vessels can get out without difficulty.

Tides rise 3 feet 4 inches at springs, and 2 feet at neaps; H.W., F. & C., at 6h. 20m.

The village of Pago-Pago is at the head of the harbour.*

LEONE BAY, on the S.W. side of the island, 12 miles from Pago-Pago, is open to the south; when the trades blow steadily it is smooth and safe. There are no outlying or hidden dangers. The shore reefs, from 100 to 300 yards from the coast, are well marked by the surf. The best anchorage is in 20 to 16 fathoms, midway between Rock Point and the opposite shore.

Tungasar Harbour, on the north side, 6½ miles from West Point, is a sheltered cove, with 10 fathoms water, open to N.W.

MASSACRE BAY is on the north side of the island.

Off the east end of the island is the islet of Anuu or Aunuu, five or six miles in circuit; off its western point is a single rock above water.

Upolu is 36 miles from Tutuila. It is 37 miles long, by 10 miles greatest breadth, of moderate height. The eastern portion is the most rugged; the main ridge runs east and west. The shore is lined with a coral reef, which is interrupted by channels, and forms snug and convenient harbours.

Off its eastern end is a small and moderately high island, covered with wood, which La Pérouse called *Ile de Pecheurs* (Fishermen's Isle) from some canoes employed when he passed.

APIA HARBOUR, on the north side, 20 miles from the East Point, is a good reef harbour, the opening into which will show itself, and the eye will be sufficient guide; the depth decreases gradually from 15 fathoms at the entrance to 8 fathoms. Anchor in 7 fathoms, and moor east and west. There is a good pilot who boards well to windward. The trade wind is fair in or out. There is a considerable trade with Apia. Water is easily obtained.

FANGALOA HARBOUR lies on the N.E. side of the island, three or four leagues from its east end; it is not recommended as an anchorage.†

Manono Island is enclosed within the sea reef of Upolu, at its west end. Its highest part is 472 feet above the sea. Soundings extend to it from Savaii and Upolu.

From Manono to Apolima is a short mile; from the west end of Manono reefs extend about one-eighth of a mile, terminating in a small islet. The rest of the channel appears clear. From Nupola the reef runs southward. A small rock lies off the eastern end of Manono.

Outside the line of the reefs to the N.W. of Apia, about two leagues, is a shoal, with 12 to 13 fathoms in the centre.

From Apolima to Savaii (the westernmost of the group) is seven miles, four or five miles of which are clear for ships. One-eighth of a mile west from Apolima is a small rock, and the reef runs off Savaii two or three miles.

Savaii, the largest of the group, is 40 miles long and 20 miles broad; its shore is low. In the middle of the island is a peak 4,000 feet high, the highest of the group. It produces the citron, nutmeg, indigo, coffee, and sugar-cane. Water gushes out near the shore in copious springs. There are few places where boats can land, and only one harbour for ships, that of Mataatua, but this is exposed to north-west gales.

MATAATU BAY, off the north point of the island, affords good anchorage with trade winds, and is the only place on the island where a vessel can stay with safety. Supplies of hogs, poultry, and vegetables may be had in abundance; wood and water are easily obtained. The Bay of Mataatua is much exposed at all seasons; but between December and the end of March, when north and north-west winds prevail, it is dangerous. Vessels intending to anchor off Mataatua should give the reef which projects from the point a berth of half a mile, as there is shoal water off it; two cables off it five fathoms were had; there is said to be less.

* Pago-Pago is of considerable importance, on account of the facilities it affords as a coaling station.

† SHOALS.—Two shoals are said to exist off the north side of Upolu; one off Moatoa, about seven miles north, about three fathoms; one off Utumau, about six or seven miles due north, also about three fathoms.—Captain Worth, R.N., 1848.

Westward of Apia Harbour are several rocky patches beyond the main reef. H.M.S. *Blanche* passed over one in about five fathoms, with Apia Mountain S.E. by E.

Mr. R. Turpin, 'John Williams,' reports: that in 12° 18' S., 170° 38' W. (approximate), 18 fathoms were obtained, sand and coral; for five miles in a north-easterly direction there was a confused and irregular sea; also, a coral shoal, with probably 12 to 15 fathoms, with Peak of Apia S. 8° W., Manono W. by S. † S.

Among the principal exports from Samoa are copra, cotton, fungus, ginger, nutmeg, arrowroot, pearl shell, and beche-de-mer. Sugar-cane, coffee, and maize are also cultivated, and a prolific kind of rice. Most vegetables grow well, and the usual tropical fruits are abundant. There are forests of valuable timber. Water power is available. Cattle, horses, and goats do well. Pigs are abundant, and an excellent wild pigeon. From the above it will be evident that this will become a valuable group of islands.

A shoal is said to exist 40 miles west of the west point of Savaii.

Nieu or Savage Island, about 200 feet high, nine miles long from south to north-west. The north-west point is about $19^{\circ} 0' S.$, $169^{\circ} 50' 40'' W.$ This island is frequently visited by traders; it exports arrowroot, cotton, fungus, and some copra. Pigs and yams are abundant. There are several temporary anchorages for traders, viz., two on the west side, one off Mission Station, and one off S. W. end of island.

Boscawen Island, Niua-Tabu-Tabu, or Cocos, one of two islands northward of the Friendly Islands, is a high island, one entire mountain, about 2,000 feet high, it is in $15^{\circ} 52' S.$, $173^{\circ} 50' W.$

Keppel, or Verraders Island, the other, is much lower, and of greater length, and lies seven miles south by east from Boscawen Island. Its position is about $15^{\circ} 52' S.$, $173^{\circ} 52' W.$ (There is evidently a discrepancy in the latitudes.) On the north shore is an extensive coral reef with a lagoon inside. A dangerous coral reef extends a mile off the south-west end of Keppel Island.

Curacoa Reef is a dangerous coral patch not always breaking, about 60 yards in extent, lat. $15^{\circ} 31' S.$, long. $173^{\circ} 44' W.$, and 15 to 20 miles E. N. E. of Boscawen Island. The Ten-fathom Bank sounded on by H. M. S. Curacoa lies about $9\frac{1}{2}$ miles S. $38^{\circ} E.$ from the reef, in $15^{\circ} 40' S.$, $173^{\circ} 40' W.$ *

Niau Fu, or Proby Island, is probably the Goede Hope Island of Schouten. Consolation Islands are possibly the Cocos and Verraders Islands. Brinsmade Island is probably the same. Niua Fu is a volcanic island, $3\frac{1}{2}$ miles from north to south, and three miles from east to west, about 500 to 600 feet high. The cocoanuts on this island equal those of Rotumah. Copra is obtained here; pigs, vegetables, and fish are abundant.

There is only one spot where a vessel can anchor, on the west side, in 15 fathoms sand, a cable from the shore, too close to be a safe berth. The principal landing-place lies on the N. E. side of the island, marked by a flagstaff; $2\frac{1}{2}$ miles eastward of it is a small boat harbour. "A deep bay on N. W. side, open to N. W., forms a good harbour. The trade is in the hands of Germans."—Captain Murray.

The N. W. extreme, where is the principal village, is in $15^{\circ} 34' S.$, $175^{\circ} 41' W.$

HOME BANK, or Lalla Rookh Bank, in $12^{\circ} 53' S.$, $175^{\circ} 31' W.$, is said to be six miles long W. by S., and 4 miles broad. Ten fathoms were found, but in many parts there appeared to be less.

Uvea, or Wallis Island, is seven miles long north and south, but surrounded by a reef 14 miles in extent north and south, and seven miles from east to west, with some islets off its north, east, and south sides. Between the two to the S. W. is the Houi Kolou entrance to Allier Bay, the anchorage. On the starboard side is the islet of Fenua-fu, in $13^{\circ} 24' S.$, $176^{\circ} 12' W.$ The depth in the entrance is 13 to 20 fathoms; it is not over a cable wide in a N. N. E. direction. Mua is on the south point of the island.

"It is believed that a passage for large ships to sail completely round the island inside the great reef exists, with anchorage at any part. Of the four entrances through the reef, three are reported available for large ships, but the best entrance—hitherto solely used—is the southern one."—H. M. S. Basilisk, 1872.

The following remarks (abridged) are by Captain Sir E. Home:—"The island is of moderate height, with one hill higher than the rest. The remarkable rock called the Sail Rock was reported as a boat coming out: the village appears a cliff or patch of barren rocks amongst the foliage which

* The Zephyr, 1876, reported an extensive shoal on which is said to be a rock awash in $15^{\circ} 58' S.$, $177^{\circ} 10' W.$

surrounds it. A pilot was received, a native of France; when it was slack water, stood in N. by E. $\frac{1}{2}$ E. for the opening, a channel 120 yards wide, through which the tide runs about eight miles per hour. Great attention is required at the helm; the length of this narrow channel is about a quarter of a mile. Having passed the reef haul up N.E. by E. Two patches of coral will be seen; pass between them; that on the starboard hand has fourteen feet, the other five feet water upon it; care must be taken to avoid other patches; the eye will be a sufficient guide: the Sail Rock will be seen ahead; the anchorage is about a quarter of a mile south of it, in 22 fathoms, sand and coral, Sail Rock N. 9° E., the centre of the hill, near the entrance, N. 74° W. The south side of the harbour is bounded by a line of low sandy islands, connected by coral reefs, on which the sea continually breaks. No good water is to be obtained here. This anchorage is not good, being coral and sand; anchors are frequently lost, but the danger of the passage in or out, caused by the force tide through the narrowness of the channel, is a sufficient objection to it. The rise of the tide is eight feet."

Capt. C. W. Hope, R.N., H.M.S. Brisk, adds, "The channel to the inner anchorage is very tortuous between patches of coral, which in favourable weather are easily seen, and present no difficulty to a steamer; a ship should not, however, proceed to it without a pilot." Copra and beche-de-mer are obtained here.

Futuna, or Hoorne Islands—Futuna and Alofi. Mount Schouten, the highest point, is 2,500 feet above the sea; on its northern side many rocks are visible. Water and provisions in abundance may be procured.

Futuna is seven miles long and five miles broad. Mount Schouten is in $14^{\circ} 14' S.$, $178^{\circ} 7' W.$

"The principal village and a large church are on the north-east side of Futuna, cocoa-nut and bread-fruit tree groves extending for four or five miles along the coast, the entire length of which is fringed by a flat shore reef, on which the surf with the prevailing winds breaks heavily. The boats were unable to land; canoes passed readily through the surf, but were repeatedly swamped.

"The harbour, on the S.W. side of the island, is open to the S.W., but sheltered from all other winds. It is comparatively easy of access, but sunken patches of coral render a pilot advisable. A large white cross is placed on the south side of the harbour on a hill, to guide vessels in. The anchorage is on sandy bottom, with six to eight fathoms from 100 to 200 yards from the shore; at 400 yards there are 18 fathoms."—H.M.S. Chameleon, 1872.

"The channel between Futuna and Alofi is about a mile wide between the reefs, N.E. and S.W. The current sets directly through."—H.M.S. Basilisk.

THE FIJI ISLANDS.

This description is necessarily much abridged, and must be used in connection with the chart.

Fiji consists of about 312 islands, containing a total area of 8,034 square miles. About 70 are inhabited.

Earthquakes are not unfrequent, and generally occur in February. The climate is well adapted to all tropical plants, and to a few of those of the temperate zone in the mountainous portions of the islands. It is very different on the opposite sides of the islands. The windward sides, refreshed by showers, exhibit luxuriant vegetation. The lee sides, on the contrary, have a burnt and barren appearance from want of moisture. The difference in temperature, however, is not great. The winds, from April to November, prevail from the E.N.E. to S.E., at times blowing a fresh trade. From November till April northerly winds are often experienced, and in February and March heavy gales are frequent. They usually begin at north-east, pass round to north and north-west, from which quarters they blow with the most violence; then hauling westward they moderate. They generally last two or three days.

The tides appear to be irregular, until closely studied. The flood sets in opposite directions on the eastern and western sides of the group. Thus,

on the south side of Vanua-Levu it flows from the east as far as Buia Point, where it is met by the flood coming from the west. It is H.W. F. & C. at Ovalau at 6h. 10m.; at Muthuata, 5h. 30m.; spring, rise 6 feet. The currents set strongly in and out of the passages until the water rises above the level of the reefs. The current seems to set in a contrary direction from what might at first be assumed, or to the eastward about half a mile an hour. Canoes wrecked to the westward are always drifted upon these islands.

Vatoo, or **Turtle Island**, the south-easternmost, and also the weathermost of the archipelago, is low and dangerous. In the Admiralty Chart, 2691, its north point is placed in $19^{\circ} 49' S.$, $178^{\circ} 14' E.$, is 209 feet high, and with the detached reef Vuata-Vatoo extends about nine miles in a N.N.E and S.S.W. direction, with very deep water all round.

Ogea, the south-east islands of the main group, two islands enclosed in the same reef, with an entrance on its west side, and a harbour, the Port Refuge of Wilkes. The islands are barren, and no water is to be found.

Three and a half miles E. by S. of Ogea-nariki is a dangerous reef and sandbank, Nugu Ogea.*

Fulaga lies west of Ogea. Its west bluff is 150 feet high. Fine timber grows on it. Its surrounding reef contains a central basin, the entrance on the north-east side, suitable for small vessels. The tide rushes strongly in and out of it. Beche-de-mer, good water, fruit, vegetables, and poultry, can be obtained; the beach abounds with good oysters.

Moramba, a small island, lies $14'$ W.N.W. (chart) of Fulaga, well walled, and surrounded by a reef.

KABARA is next westward of Moramba, about $4\frac{1}{2}$ miles long and three miles wide, and is the westernmost of the eastern group; its timber is much esteemed for canoe building, cocoanut groves abound. It is not entirely surrounded by the reef, which is wanting on the north-west side. It has a bell-shaped peak on its north-west side, a good landmark. It is 470 feet high. North of this hill is good anchorage in 12 fathoms protected from winds from north-east round south to S.S.W. Copra, arrowroot, etc.

EKABA (? Wangava), N.N.E. of the foregoing, is two miles long by one mile wide; no harbour.

Tabunc-Siki (chart Taranasiei), a small uninhabited island 200 feet high, 13 miles north-west of Kabara.

Between this range of islands and those eastward is Fulaga Channel, which appears to be clear. Its south entrance is between Ogea and Fulaga.

ANGASA, 8 miles north of Ogea—remarkable for long, regular ridges—is with three smaller ones enclosed in one extensive reef along with several small islets. Eastward and north-eastward of Ogea and Angasa are several detached reefs, extending $5\frac{1}{2}$ miles off the island (see chart).

NAMUKU has an extensive reef round it, and has fair anchorage on the north-west side in 7 to 13 fathoms for vessels up to 14 feet draught. The shore reef extends $1\frac{1}{4}$ miles south-west of this island. North of this are Komu-Levu $1\frac{1}{2}$ miles long and 270 feet high, and Komo-Riki, $1\frac{1}{2}$ cables across and 70 feet high, enclosed in the same reef, through which is a passage on the north-east side leading to an anchorage large enough for several vessels of large size in 5 to 10 fathoms sand and shells (see chart for Tavunuku Reef, westward of Komo).

Ularua, or Olenea, north-westward of Komo, is a small, desolate island, surrounded by a reef.

WILKES REEF (Talanda) lies $3\frac{1}{2}$ miles N. E. $\frac{1}{2}$ E. of entrance to Namuku Harbour, is seven cables long by three broad, and dries at low water. Two cables south of it is a two-fathom bank.

MOTHA, or Moce, eastward of Komo is about two miles in diameter, surrounded by an extensive reef through which there is only a boat entrance on the east side. Anchorage off the reef on the north-west side in 12 fathoms sand, with the summit S.E. by E. $\frac{1}{2}$ E. Motha forms the south side of the Oncata Channel; it is a good landmark, being 590 feet high with

* Captain Claverly, City of New York, 1877, reports the south-east extreme of this group as in $175^{\circ} 20' E.$, or $10'$ east of position in chart 2691.

sloping sides. There are three detached reefs eastward within a few miles of it.

Oneata, north of Motha, forms the north side of Oneata Channel, is a low island lying N.E. by E. and S.W. by W., $2\frac{1}{2}$ miles long and half a mile broad, within a barrier reef, 26 miles round and a dangerous (horn $5\frac{1}{4}$ miles E. $\frac{1}{2}$ N. of Loa Island. Its highest point is 160 feet high. Six cables north-east connected with Oneata by a sunken reef, is Loa (Observatory) Islet 140 feet high. The village is in a sandy bay on the south-east coast of Oneata.

ONEATA LAGOON has four entrances, Broken Passage, Middle Passage, Schooner Passage, and Transit Passage.

BROKEN PASSAGE is 1,600 yards across, with three patches in it dividing it into four channels. From the best the summit of Loa Island bears south-west.

MIDDLE PASSAGE, with Loa summit E.S.E., is 500 yards across, with 13 fathoms in the centre. A small coral head with two feet on it at low water lies two cables inside the centre of the passage. It may be passed on either hand.

SCHOONER PASSAGE is not recommended for any but small vessels. From it Loa Island bears east by south.

TRANSIT PASSAGE is 400 yards across, with six fathoms in the centre. The right extreme of Loa Hill in line with north point of Oneata East, leads to it, but not through, as a spit connected with the north side lies on the bearing.

CAUTION.—These passages for sailing vessels with a foul tide require a commanding breeze.

Between Oneata and Lakemba are the two Echouas, or Aiva Islands, about 200 feet high, surrounded by an extensive reef 19 miles long, a large opening on the N.N.W. side where ships can enter at any time.

Lakemba, the largest island of the eastern group, is nearly round, with an extensive encircling reef. The town is on the south side. The highest peak is 714 feet. The reef extends six miles from the island E.N.E. There are two openings, one on the south-east side sufficient for large vessels, but dangerous, from the coral patches which stud it, and one opposite the town on the south side, fit for a vessel of 100 or 200 tons; but the space is very confined, and it would be necessary to moor head and stern. Steamers can enter the lagoon by bringing the right extreme of the island W. by N. $\frac{1}{2}$ N., and coming from the mast-head with favourable light. Numerous rocks lie in the passage. Anchorage in 13 fathoms, sand and coral. Products: Copra, yams, turtle, and abundance of fish. From the south extremity a reef extends $1\frac{1}{2}$ miles off.

Argo Reef.—Eastward of Lakemba is the great Argo Reef, one of the most extensive and dangerous in the group. Detached from it and $4\frac{1}{2}$ miles north-eastward of its north extreme are the Reid Islets, surrounded by an extensive reef.

Malan Bank, eight fathoms, lies one mile south-east from south-east horn of Reid Reef. H.M.S. *Alacrity*, 1878, reports an error of $1\frac{3}{4}$ miles in latitude, and $7\frac{1}{2}$ miles in longitude, in position of Argo Reef, Reid Islands, and the other dangers of this group.

NAIAU rises in perpendicular cliffs from the sea to the height of 550 feet, with a depression in the centre. It offers no facilities for the visits of vessels.

MAAFU ROCK, with 18 feet on it at low water, bears N.E. $\frac{1}{2}$ N., seven miles from the boat passage off Ndevo, on east side of Naiau. The patch of discoloured water, of which it is the shallowest part, is one cable broad, with six to nine fathoms, coral and sand. The rock, five yards in diameter, is on its north-west edge. It seldom breaks, and is difficult to see in fine weather.

TABUCA or **TUVUTHA**, 30 miles north of Lakemba, has a remarkable peak on its N.W. end, with two boat entrances on the N.W. and S.W. sides. There are two small reefs.*

A barrier reef, two to three cables in width, encircles it. The lagoon within has a depth of two to nine fathoms, sand and coral. A horn of the

* Between Tabuca and Cicia, sunken rocks with two fathoms over them have been doubtfully reported to be in $17^{\circ} 49\frac{1}{2}'$ S., long, $179^{\circ} 2\frac{1}{2}'$ W.

barrier, one mile south of the village, affords protection from the sea to small vessels in winds from S.E. through East to N.W. Anchorage may be obtained in 7 to 14 fathoms close to the reef. $1\frac{1}{2}$ miles N.W. of the village is a boat entrance in the reef. Food is scarce, but good water can be obtained, and copra.

TAVANUKU-I-WAI (Quinn Reef) is two miles S.S.W. of the anchorage off Tuvuthi, is circular in form, seven to nine cables in diameter.

TAVANUKU-I-VANUA (Smith Reef), is $3\frac{1}{2}$ miles S. $\frac{1}{2}$ E. from the anchorage, four to five cables in diameter, with a sand cay in the centre, which can be seen many miles on a bright day, being four feet above high water. Turtle are caught in summer months.

Eastward of Tabuca lies the small island of Aro, with three reefs in its neighbourhood, one (Gordon Reef) lying N.E. 7 miles; another, E. $\frac{1}{2}$ S. $2\frac{1}{2}$ miles; the third, S. $\frac{1}{2}$ E. $2\frac{1}{2}$ miles. The turtle season here begins in October and ends in February.

CICIA, OR THITHEA, lies 20 miles N.W. of Naiau; a shore reef extends round it, with no opening but for canoes. Its highest point is 540 feet high. Cotton is grown on it. Anchorage for small craft on N.W. side; good water. There is a small reef (Kneass Reef) to the S.W., with a passage between it and the island. Extensive cocoa-nut groves clothe its low points.

MANGO, 18 miles to the N.N.E. of Cicia, "is three miles in diameter, surrounded by a reef, half a mile broad, except at one part on the north side, where is merely a narrow fringe, and a ledge of sand and coral, suitable for anchorage in winds from S.W., through S., to E. In this a buoy has been moored, in 14 fathoms sand and coral, to which vessels of 200 tons may secure. Good landing at the pier, except in strong north winds.

CAUTION.—The anchorage is not safe in summer months. Sailing vessels should put to sea when the wind veers to N.E. Near the edge of reef on S.W. side are three small islets. The highest hill is 670 feet. Copra and sea cotton are exported. Products—Coffee, limes, oranges, pine-apples, kumaras, yams, and bread fruit. H.W. F. & C. at the pier 6h. 10m.; rise 3 to 4 feet."—H.M.S. Alacrity, 1878-9.

Vikai, five miles north of Tabuca, a low islet, with a reef surrounding it to the distance of $1\frac{1}{2}$ miles, is resorted to during the turtle season.

Katafanga, eight miles E.N.E. of Vikai, also a small isle. "It produces cotton and copra. Supplies of yams, kumaras, turkeys, fowls, eggs, and good water can be obtained. The passage into the lagoon is near the N.E. coast; vessels drawing 10 feet can navigate it with a commanding breeze. The greatest depth within lagoon is 13 fathoms. It is surrounded by a reef which on the east side reaches $2\frac{3}{4}$ miles from the land. It has two summits, 180 feet high."—H.M.S. Alacrity, 1879.

MALEVUVU REEF, N. by E. $\frac{1}{4}$ E., $4\frac{3}{4}$ miles from the Katafanga Passage, is dangerous, because in the track of vessels approaching from the eastward bound from Tonga to Lomaloma. It lies N. by W. and S. by E., two and two-thirds miles long, $1\frac{1}{2}$ broad, with 13 fathoms, sand and coral, in the centre. Near the south end is a sand cay, awash at high water. Boats can enter on the west side at any time of tide.

The Exploring Islands lie northward of the foregoing, seven in number, all of considerable size.

The information contained in this notice is to be carefully compared with the chart when navigating the parts to which it refers:—

"HYDROGRAPHIC NOTICE.—The following relating to the Lau or Eastern Group has been received from Lieut. W. U. Moore, commanding H.M. Surveying Schooner Alacrity, 1878-9.

"LAU OR EASTERN GROUP.*

"Suva to Lomaloma.—Sailing vessels bound from Suva to Lomaloma should endeavour to weather the island of Ngau by daylight, and then steer to pass to leeward of Thithia (? Cicia).

In approaching Tongan Pass, leading into Vanua Mbalavu lagoon, it is better to keep well towards Vekai, as a westerly current is often experienced off the horn of the barrier reef, south of Munia.

* See Admiralty charts, Nos. 730 and 2691.

"**Levuka to Lomaloma.**—Sailing from Levuka to Lomaloma pass half way between the Horse-shoe Reef and the north point of the Nairai barrier, using a bearing of Mbatiki to clear the latter.

"**The Exploring Islands**, enclosed within a barrier reef, of triangular shape, 77 miles in extent, with many passages leading into it.*

"The most important in Lau will be first described.

"**Vanua Mbalavu**, on the west side of the triangle, an irregular shaped island 14 miles long, and from a half to $2\frac{1}{2}$ miles broad, with several peaks, the highest, Koro Mbasanga, in the centre of the island, is 930 feet high. The island runs N.N.E. and N.W., a sharp bend occurring under Koro Mbasanga.

"**Lomaloma Harrou**, between Yanuyanu and the town, is small and well protected, with good anchorage for a vessel of large size in seven fathoms, sand and mud. Vessels over 200 tons have to warp out, as a long spit running out west of Yanuyanu, narrows the space for tacking. Supplies of yams, eggs, turkeys, fowls, milk, and bread, can occasionally be obtained

"Yanuyanu (the island) was the quarantine station in 1878.

"**Ngillangillah** is close off the north-west extreme of Vanua Mbalavu, 510 feet high.

"**Andiwa** and **Yanuthalua**, small islands off the west coast of Vanua Mbalavu, 250 feet and 170 feet high respectively. There are several smaller islets and rocks around and near the coast of Vanua Mbalavu, for which the navigator is referred to the chart."

The other islands are Munia, Susui, Malatta, Cikobia, and Osobo.

Munia is the southernmost of the group. The anchorage, Discovery Harbour, is described as a good one, $8\frac{1}{2}$ fathoms, fine sand. The highest peak is 950 feet high. Landing is difficult.

Cikobia or Thikombia, five miles north-east of Munia, is flat-topped, with several notches. It is 550 feet high.

Susui lies between Muuia and Vanua-Balavu, 430 feet high, $2\frac{1}{2}$ miles long, and two-thirds of a mile broad, is used as a grazing ground for cattle. Good water may be obtained on the north-west side, where there is a good harbour, secure from all winds (not mentioned, however, by Lieut. Moore). The southern side is close to the surrounding reef, a horn of which stretches to the south-west $1\frac{1}{2}$ miles, and is in line with the west end of Kanacea Island, on a W. by N. $\frac{1}{2}$ N. bearing.

Malatta, the next island to Susui, 430 feet high, is much smaller. The reefs between it and Vanua-Balavu, and Susui dry at three-quarter and half ebb respectively. Many families have emigrated to Lomaloma to grow cotton. On the west side of Vanua-Balavu are two openings in the reef, a harbour, and a stream of water.

Avea is a small island to the north-east of Vanua-Balavu, 610 feet high, and four miles E.N.E. of it is a small cluster called Osubu, or the Three Brothers (Sovu).

"Passages into the Vanua Mbalavu lagoon most frequently used are—

"(1.) The Tongan Pass, on the south-east side of the barrier reef;

"(2.) The American Passage, on the eastern side; and

"(3.) The Ngillangillah Passage, at the north-west corner of the lagoon, close to the island of the same name.

"Tongan Pass—most frequently used for entering, is about midway between Thikombia and Munia, three-quarters of a mile broad, with a coral patch 250 yards in diameter, awash at low water in the centre. With the prevailing wind it is easily taken, provided the light is favourable.

"Tides are irregular. The flood was observed more than once setting out of the lagoon.

"**DIRECTIONS.**—The summit of Avea N.W. $\frac{1}{2}$ N. leads to the Tongan Pass. Continue this course $1\frac{3}{4}$ miles inside the lagoon until Yanuyanu (which appears a point of the main island standing out in relief) bears

* This is one of the few barrier reefs in Fiji which have a sloping outer edge to windward, with a bank of soundings on which, in case of necessity, a vessel might anchor. The majority of reefs in Fiji are steep-to on the south and east sides, and seldom admit of the possibility of bringing up with an anchor clear of the breakers.

W. $\frac{1}{2}$ S., when steer for Lomaloma, and enter the harbour to the north of Yanuyanu. This track, the least strewn with reefs, must be occasionally altered to avoid coral heads. Lomaloma harbour can be entered either side of Yanuyanu; the north is most convenient.

“CAUTION.—Unless the light is favourable and the look-out vigilant, the navigation of this lagoon is hazardous. It is seldom safe to steer to the westward in it after 2 p.m.

“AMERICAN PASSAGE, east five miles from Sovu Islets, useful for vessels to and from Samoa and America, is easily navigated with the prevailing wind either in or out. It is three-quarters of a mile broad. On a clear day Koro Mbasanga, W.S.W., leads to it.

“**NUKU THIKOMBIA REEF**, four miles south-east of American Passage, protects it to some extent from the south-easterly swell. It is $3\frac{1}{2}$ miles long N.N.E. and S.S.W. On its south-western end is a sand cay 200 yards in diameter and four feet above high water, on which there is a cairn of stones eight feet above high water.

“**NGILLANGILLAH PASSAGE** is useful for steamers bound between Levuka and Lomaloma. There are many coral heads outside it, through which a course can be steered without difficulty, when the light is favourable. The narrowest part is 300 yards wide. Tides run strong through it, but regularly. The track to Lomaloma leads round the north coast of Vanua Mbalavu, which is fronted by numerous coral heads. Off Blackswan Point the distance off the barrier reef is only 300 yards, with a patch in the centre of the channel. The shore should be kept close on board. Besides these passages there are the three Sovu Passages, north and north-west of the Sovu Islets. Large sailing vessels would find one of them an easier means of exit from the lagoon than beating through the Tongan Pass, or navigating the north side of Vanua Mbalavu with an afternoon sun. The **Andiawathe Passage**, west of Vanua Mbalavu, is of little use to any but coasting craft.

“**MALIMA**, two small islets W. $\frac{1}{2}$ N. $8\frac{1}{2}$ miles from Ngillangillah Passage, in a lagoon which is $1\frac{1}{2}$ to 2 miles in diameter, protected by a barrier reef awash at low water. The largest and most southern is 130 feet high.

“**Kanathea**, a round island, $2\frac{1}{4}$ miles in diameter, with conspicuous peaks, the highest 830 feet high. It is surrounded by a reef, which on the north side extends nearly a mile from the shore as a fringe, and on the east opens out into a barrier, its north-east end being N.E. by N. six miles from Kanathea, leaving a passage of a little over a mile between it and the Vanua Mbalavu barrier reef. The sea does not break on this barrier on the north-west side, and there are very moderate rollers on the south-east side in ordinary weather. Cotton and copra.

SMALL CRAFT HARBOUR.—On the north side of the island is an indentation in the shore reef about 130 yards broad, where small craft can anchor a short distance off the beach.

BOEHM Rock is a patch awash at low water, 200 yards in diameter, N.N.E. $\frac{1}{2}$ E., $1\frac{1}{2}$ miles from Small Craft Harbour.

DANGER MARKS.—The left extreme of Kanathea in line with the centre of Mango Island S. $\frac{1}{4}$ E. leads over Boehm Rock.

“**MORSE REEF**, $1\frac{1}{2}$ miles south-east of Kanathea, and half a mile S.S.E. of the south elbow of the barrier reef, is small, and breaks heavily in moderate weather.”

Frost Reef, “dry at low-water springs, lies W. by S. $7\frac{1}{2}$ miles from Mango Pier, is circular, and one mile in diameter. A rock two feet above high water is near its northern edge. **CLEARING MARKS**: Vessels from Mango to Levuka should keep the right extreme of Munia in line with the left extreme of Mango, W. by S. $\frac{3}{4}$ S., until they have cleared Morse Reef.”—H.M.S. *Alacrity*, 1879. There is a heavy break on the east side of the reef, and apparently a spit extends off the south-east part of the reef, over which there was no break.

Vatu-vara or **Hat Island** lies 17 miles west of Mango, is small, its centre 1,000 feet high, as even as a table on its summit. It is the best mark in this part of the Archipelago. Position, $17^{\circ} 25' S.$, $179^{\circ} 33' W.$ A reef extends a mile south-west from it, and a short reef off its south side.

Nugatobe Islets, three in number, are small, and covered with trees, the two westernmost enclosed in the same reef.

Yathata, a high island, with a bell-shaped peak, lies north of Vaturera, surrounded by an extensive reef. Two low islands lying east of it are connected by a reef. It is on the southern boundary of Nanuku Passage. It has abundance of coconuts.

NAITAMBA, or Direction Island, is 17 miles N.E. of Yathata; high and rugged; of a circular form, $1\frac{1}{2}$ mile in diameter. The reef extends half a mile from it. It grows cotton.

Okimbo, East of Naitamba, three small islands enclosed in the same reef, 4 miles East and West, by 3 miles North and South, and 7 miles North of N.W. point of Vanua-valavo. The detached reefs—1 to 4 miles long—are awash and dangerous. Turtles and beche-de-mer.

WAILANGILALA ISLANDS.—Two small low coral islands about 20 miles East of Nanuku Islets, at the N.E. part of a reef forming a lagoon, 3 miles long, N. by W. and S. by E., and $1\frac{3}{4}$ miles wide. It affords good anchorage in 15 to 18 fathoms, sand and coral. The entrance on the West side bears S.W. $\frac{1}{2}$ S. from Weilagitala Islands, and is half a cable broad, with a depth of 7 fathoms. H.M.S. "Pearl," 1876, reports a heavy line of breakers, E. by N., $7\frac{1}{2}$ miles from Wailangilala, which is supposed to be identical with the Duff Reef on chart 2691, $6\frac{1}{2}$ miles to south-westward. The reef to the East of Wailangilala has an extensive sand-bank on it. Capt. Wilkes has named this the Duff Reef, but a casual glance will show this to be erroneous.

NANUKU PASSAGE between Wailangilala and Nanuku, and its reef lies N.E. and S.W. The islands to the North of this passage are small, low, and surrounded by extensive reefs. The most northern are Korotuna and Nukulevu.

Nanuku Islets, 24 miles E. $\frac{1}{2}$ N. from North point of Taviuni Island, are two small coral islets, a quarter of a mile apart N. by E. $\frac{1}{2}$ E. and S. by W. $\frac{1}{2}$ W., about three-quarters of a mile within the south extreme of a long reef; from the islets the reef extends 3 miles N.N.E., thence N.E. 6 miles, then trends abruptly W.N.W. Anchorage could not be obtained in the vicinity of the islets, the reef being steep-to on both sides.* Between Nuku (or Ngele), Levu, and Nanuku Reef is the "cluster" Ringgold isles and reefs, for which see chart. The tides are strong in the vicinity, and upon these small reefs there is scarce a ruffle of the sea to apprise of the danger. Too much precaution cannot be used in approaching this part of the group. The currents and tides are irregular, much governed by the winds, and at times run with great velocity through the passages. The highest of the "Clusters"—Budd Island, on the west side—is 800 feet high. The islands in its neighbourhood are dangerous to approach, the reefs extend as far as the eye can reach.

Chicobea, or Thikombia, the most northern island of the archipelago, has two hummocks of considerable elevation. It is three miles long, S.E. and N.W., and $1\frac{3}{4}$ miles wide, surrounded by a shore reef. There are two small reefs off its south-east end, the outer one two miles from the point.

Ngele Levu, three miles in circuit, and 30 feet high, is the largest of the eastern Ringgold Isles, lies N. by E. 14 miles from the larger Nukubasaga Islet. On its west side is a lagoon, 12 miles from east to west, and five miles at its broadest part; no dangers were found; anchorage may be obtained in any part of it in 10 to 13 fathoms; there are several openings into it at the west end of the reef.

Korotuna, 14 miles west of Ngele Levu, is three-quarters of a mile from north-east to south-west, surrounded by a fringing reef, extending three-quarters of a mile from the shore.

Taviuni, or Vuna, one of the principal islands of the group, is 25 miles long and five miles wide. Its central ridge is 2,052 feet high. It is now one of the principal cotton-producing islands of the group.

VUNA POINT ANCHORAGE, off the plantations north of Vuna Point, the

* DANGEROUS ROCK, supposed to exist near the middle of Nanuku Passage, was searched for in H.M.S. "Beagle," and also by H.M.S. "Dido," in 1874, but could not be found.

south-west point of the island, should only be used in fine weather with off-shore winds, as it is small, and the bank of soundings affording anchorage is steep, with bad holding ground: vessels should be prepared to weigh directly a westerly wind sets in, as there is not room to swing. The best anchorage is in 10 fathoms, sand, with Hamilton store (a prominent zinc building on the beach) in line with a small house on the hill behind it. There is a landing jetty here.

A reef, always breaking, extends $1\frac{1}{2}$ miles westward from Vuna Point. Off the north-east point of Taviuni the reef extends seven or eight cables.

Somu-Somu, the principal town of the island, also one of the chief towns of the Fiji group, stands on the north-west side of the island.

Goat Island is surrounded by a reef, which extends a mile southward, three-quarters of a mile westward, and a mile northward. Somu-Somu, E. by S. $\frac{1}{2}$ S., leads in five fathoms over the reef, northward from Goat Island. Between Goat Island and Taviuni Island is an intricate channel, fit only for small vessels. The Pearl anchored in 15 fathoms, soft bottom, a cable from the shore reef, off Somu-Somu town, with Goat Island W. by S., and the right extreme of Vanua Levu Island N. by W. $\frac{3}{4}$ W. there is 10 fathoms half a cable from the shore reef, shoaling quickly to five and four fathoms. The sediment from a small river near Somu-Somu appears to have settled on the reef and formed a soft bank, which affords good holding ground. From the anchorage steer W.N.W. to clear the reef off north end of Goat Island.

SOMU-SOMU STRAIT is five miles wide in its narrowest part. The tides are strong; the ebb runs N.E, the flood S.W. There is a navigable passage between Vuna and Corolib, but it is made somewhat intricate by sunken coral knolls and banks of sand. These shoals extend two miles beyond the island into the strait.

From Vuna Point bound to Somu Somu steer with the east extremity of Rabi Island N. $\frac{3}{4}$ E., to pass between the shoal patches which extend three-quarters of a mile westward of Goat Island, and the detached reefs which extend two miles from Mount Coconut Point on the west side of the strait; the channel here is not over two miles wide. The east extremity of the shoals off Mount Coconut Point is in line with the west extremity of Rabi Island, N. $\frac{1}{2}$ W.

TASMAN STRAIT, on the eastern side of Vuna, is between that island and Ngamea. It affords a safe passage. There is a fine harbour—Tobou—well protected from north winds, and is formed by an extensive reef and sand-bank. Tasman Strait should not be attempted except in favourable weather, and with favourable light. Calms are frequent under the high lands of Ngamea, the tides run strong, the ebb setting northward, the flood southward. There are coral patches requiring a careful look-out.

Vuro-Vuro Bay, on the north side of a small promontory, on the west side of the southern entrance to Tasman Strait, affords good anchorage in 15 fathoms, sand, protected from nearly all winds; good water can be obtained. From the north point of Vuro-Vuro Bay a reef extends towards Ngamea Island, contracting Tasman Strait to less than one mile; the outlying reefs in the strait are easily distinguished on a clear day.

Ngamea is on the eastern side of Tasman Strait, the coast indented with deep bays. South-eastward of Ngamea and Lauthala Islands 1 to $1\frac{1}{2}$ miles, lies a reef which partially surrounds them.

Thane Reef, which breaks heavily, is half a mile in diameter, and lies N.E. by E. $6\frac{1}{2}$ miles from the south point of Lauthala Island.

Vanua-Levu is the great northern Island of the group. Its length is about 96 miles from E.S.E. to W.N.W., and its breadth about 25 miles.

CAUTION.—On the north and north-west sides of Vanua-Levu Island, several shoals exist whose positions are imperfectly known; a good look-out from aloft is necessary to insure safe navigation. Inside the barrier reef which extends from Vanua-Levu towards the Yasawa group of islands, numerous reefs and sunken patches exist; also between Vanua-Levu and Viti-Levu there are numerous reefs.

NACEVA BAY.—The north-east extremity of Vanua-Levu is Udu or Udu Point, the termination of a long, narrow peninsula. There is anchorage under its south-west point. Two small reefs front the shore near the

anchorage. Breakers have been reported in lat. $16^{\circ} 8' S.$, long. $179^{\circ} 44' W.$, or about 14 miles to the eastward of Udu Point. The tides run strongly round Udu Point, the numerous rips give the appearance of breakers. The southern side of Udu Point forms the northern limit of an extensive bay, or gulf. It affords no inducements for vessels to venture in.

Rabi Island forms the south-east point of Naceva Bay. It is lofty and broken, with many deep bights, in one on its south-east side there is anchorage. There is a settlement on its north-west side. Between it and Vanua-Levu is a passage studded with reefs.

Kea Island lies south-west of Rambé. On its north-west side is a harbour, Port Safety. Several shoal patches extend $2\frac{1}{2}$ miles south-east of Kea, and the space between it and Rabi is studded with dangers. Westward of the south-east point of Vanua-Levu is an opening in the surrounding reef, Baine Harbour. Four miles further westward is Fawn Harbour. Further west, the next opening is near the small islet of Rativa. Two miles beyond this the reef joins the shore.

SAVU-SAVU BAY, the principal opening on the south side of Vanua-Levu, is a fishesheet of deep water, 10 miles east and west, surrounded by high broken land, some of the peaks are 4,000 feet high. H.M.S. *Alacrity*, 1876, reports the long. of north-west extreme of Savu-Savu Point in $179^{\circ} 16' E.$, and that the reef off Savu-Savu Point extends not less than one mile from the point.

Off Savu Savu Point the reef extends a mile to the S.W., with some islets on it. Between this and the reef, three miles westward, is the main entrance to the bay. At six miles W.S.W. from Savu Savu Point, and $4\frac{1}{2}$ miles E.N.E. of Kobalau Point, is another entrance through the reef a mile wide. A mile eastward of Kobalau Point is a third but very narrow entrance.

There is good anchorage off the mill in the N.E. corner of Savu Savu Bay, and six miles N.E. from Savu Savu Point. On the north side of this point there is also anchorage. The middle of the bay is all deep water. Much rain falls at this place.

With a good pilot Kambelau Passage may be taken under steam or with a fairwind, the ebb tides setting strongly through to the eastward. Off Coconut Point, at the S.W. end of Vanua-Levu Island, the reefs extend in irregular patches from the shore, which should not be approached within a mile. Seleseki Point bearing N.W. northerly leads clear.

Off Kambelau Point is an island of the same name, off which is a reef, five miles long, and beyond and between it and Great Passage Island Reef is a passage, reported full of shoals. Eleven miles S.S.E. of Kambelau Point is Nemena or Direction Island, surrounded in every direction by outlying reefs. "In going westward from Savu Savu Bay, small sailing vessels gain time by passing through a break in Direction Island Reef abreast the island, as follows: steer in approaching the long reef with right extreme of Direction Island just open of left extreme of Makongai, pass a few yards from Direction Island, and take the most westerly of three breaks in the west side of the barrier."—H.M.S. *Alacrity*.

From Direction Island the reef trends W. by N.; at 10 and 20 miles respectively are the Nandi and Buia Passages, and some others. Nandi Passage has from 12 to 16 fathoms; one or two rocks, distinguishable by the eye, lie in the way. Buia Passage has about the same depth, and with care is fit for a large ship.

NANDI BAY is five miles N.E. of the south point of Vanua-Levu. On its shores and on the River Nandi are some of the best plantations.

Beyond Buia Point, the S.W. point of Vanua-Levu, the passage through the reef becomes more intricate; and opposite Rabe-Rabe Island it is quite narrow, but with sufficient water for any vessel.

Buia Passage is nearly opposite So Levu, where the anchorage is by no means good or safe. Trading vessels prefer anchoring off Ragi-Ragi, or Coconut Point, six miles further westward. Within the sea reef the current is often very strong, governed by the strength of the wind and the force of the sea breaking over. The rise is five feet.

MBUA, OR SANDALWOOD BAY, though much filled with large reefs, offers ample space for anchorage, and is formed by Lecumba Point on the East, and that of Dimba-Dimba on the West. The land immediately sur-

rounding it is low, but a few miles back rises in high peaks. That of Corobato is 2,000 feet high. The tide runs $1\frac{1}{2}$ to 2 knots, the flood to the westward, and ebb to the eastward.

The channel to Sandalwood Bay is wide and clear, and the chart, with mast-head pilotage, a sufficient guide. There is excellent anchorage in the bay with any required depth, and as the land is low, rising gradually to the neighbouring hills, it would be found a good refuge in a hurricane, and free from the devastating squalls which are whirled from the high land of Ovalau and other harbours, and which occasion such danger to shipping. These hurricanes are generally experienced in January, February, and March, the last the most dangerous month.

To reach the anchorage in Sandalwood Bay, off Mbua River, round Lakumbi Point, at the distance of three cables, bring it to bear S.S.W., and keep this bearing on until Seseleka Peak bears N.W. by W. $\frac{1}{2}$ W. In this position there are six fathoms soft mud.

Across Sandalwood Bay to Mbua the soundings decrease gradually from 14 fathoms at the entrance. The river is marked by stakes, and has two to three feet on the bar, deepening to $1\frac{1}{2}$ fathoms to the town, a mile from the entrance.

H.M.S. Pearl, going from Sandalwood Bay to Levuka, after passing half a mile outside Cocoanut Point, steered S.E. by E. $\frac{3}{4}$ E. for the westernmost Buia Passage, in which there are several sunken patches contracting it to about one cable. Several openings were seen through the reef. There is said to be a better passage further eastward.

Yadua Island lies west of Sandalwood Bay, the whole interval between foul ground. Porpoise Harbour lies to the southward; $1\frac{1}{2}$ miles deep and one mile wide, open to the south-east, but protected by a double reef. The entrance is on the east side.

North of Dimba-Dimba Point is a high peak. Beyond this is Ruku-Ruku Bay, with a reef across its mouth, leaving only a narrow ship channel. Ivaca Peak, on the north side, is 1,563 feet high. The island of Yangaga is immediately opposite this peak. Monkey-face Passage lies between them. Yangaga Island is 600 feet high; there are turtles in the season. Viedrala, Tavea, and Galoa are rocky islands, from 50 to 150 feet high. On the Monkey-face Passage side the land rises very abruptly from the sea.

In crossing Ruku-Ruku Bay, bring Seseleka Peak S $\frac{1}{2}$ E. until abreast Sleepy Point. After rounding Nai Vaaka, many reefs will be seen, including one in the centre of Monkey-face Passage, but leaving navigable channels with 13 fathoms for steam or fair wind.

Nalao Bay is a wide opening, protected on the north by two or three small islets.

Off Yangaga Island the outer edge of the Great Sea Reef is 16 miles distant. Running east and west it takes a more southerly direction toward Round Island, hereafter described. There are several small openings, very dangerous, if practicable, and within are many sunken coral patches.

The islands on the coast from Nalao Bay to Muthuata, 25 miles, are low.

The town of Mhattua is in an open valley close to high-water mark. Immediately off it lies the high island of Muthuata, which protects the harbour from the north wind, and is about a mile long. Twelve miles north of it is Kie Island, within the barrier reef. The land on this part of the coast rises abruptly from the water in peaks 2,000 feet and upwards.

Sixteen miles eastward is the island of Male. Opposite to it is the Mali Passage, and 13 miles further is the last opening on the north coast through the outer reef to the ship channel within, the Sau Sau passage 33 miles from Udu Point. There is one tolerably good harbour in the interval, Tibethe, and several towns around the bay.

Sau Sau Passage, broad and deep, may be recognized from seaward by Drua Drua Island, Kaveva Island, Monk Rock, and two rocks nearer the outer edge of the reef, which appear like vessels under sail.

Kia Island, 22 miles westward of Sau Sau Passage, on a projection of the reef 12 miles from the main land, forms a good mark for this part, and in clear weather can be seen 35 miles. H.M.S. Pearl passed in through Sau Sau Channel, skirted the reef at a distance of about two cables, in 12 to 13

fathom, as far as Sau Sau Island. Good anchorage was obtained in 10 fathoms, with Sau Sau Island N. by E $\frac{1}{4}$ E.; Kia Island W. $\frac{1}{4}$ N.; and Mali Island S.W. by S.

Mali Island has a small island near its west end, Voro Voro, joined to it at low tide. Off the north end of Mali, about mid-channel, is a shoal, with apparently less than three fathoms over it. From the north-east end of Voro Voro a spit extends one cable northward.

NDREKETI RIVER.—Off its mouth are extensive mud banks, falling gradually into deep water; it is reported that a vessel of 90 tons had passed through into the river, whose entrance is 300 yards wide, with a depth of from two to three fathoms in the deepest part, which is narrowed by mud banks. $4\frac{1}{2}$ fathoms were obtained $4\frac{1}{2}$ miles within its mouth.

The north shore of Vanua-Levu appears to be well peopled. Between the eastern and western groups, southward of Vanua Levu, is a range of islands.

Koro is one of the most fruitful islands of the group. It produces cotton, oil, and turtle shell. It lies about 30 miles north-east of Ovalau Island, is 11 miles long north-east and south-west, six miles broad, and 2,000 feet high. The south point, about 150 feet high, is much lower than the rest of the land. A reef, which breaks heavily, fringes its east and south sides, and ends in an elbow, $1\frac{1}{2}$ miles south-west of South Point. There appeared to be no fringing reef off its western shore for five miles north of South Point. Thence to North-west Point, $2\frac{1}{4}$ miles, are several reefs from a half to three-quarters of a mile from the shore. There is anchorage in 15 fathoms, coral, between the reefs off the village of Cavalailai, about $1\frac{1}{2}$ miles southward of North-west Point. Southward of the anchorage are two reefs extending westward; northward of the anchorage is a shoal, with a sand bank above water, and a reef, partly above water, lies half a mile to the north-west.

There are several villages on the west side of the island. The north-west side has a fringe reef. Numerous detached shoals lie from a half to two miles from the shore, between North-west Point and Nabuna Village, three miles north-east of it, between which are several passages for small vessels, leading to a reported good anchorage two miles eastward of North-west Point. The Alacrity anchored in seven fathoms, sand and mud, good holding ground, off Nabuna village. Eastward of Nabuna the fringe reef in some places extends nearly three-quarters of a mile from the shore, and a mile westward of North-east Point detached reefs lie nearly two miles from the shore. A spit, which breaks heavily, extends $1\frac{3}{4}$ miles N. $\frac{1}{2}$ E. from North-east Point. On the east side, from North-east Point to Nagaiduma, four miles southward, the reef does not appear to extend over a quarter of a mile off shore; but off Nagaiduma are detached reefs three-quarters and $1\frac{1}{2}$ miles from the coast. A little southward of Nagaiduma is a passage leading to an anchorage in six fathoms, mud, close to the shore near the plantation. Southward of Nagaiduma the fringe reef appears to extend about a mile from the shore. There is said to be anchorage near East Point, about three miles from Nagaiduma.

HORSE-SHOE REEF, Thacku-Momo, is 11 miles north-west of Nairai, in $17^{\circ} 39' S.$, $179^{\circ} 16' E.$, awash at half ebb, with but one narrow opening to a basin of 12 fathoms depth. The distance between this reef and the northern elbow of that bounding Nairai Island is $7\frac{1}{2}$ miles.

Nairai Island, 31 miles E.S.E. of Ovalau, lies north and south, 4 miles long, and 3 miles broad, surrounded by a reef which extends 5 miles from the west end, and from the north and south extremes 4 miles. An opening, leading into sheltered anchorage, 3 miles in extent, and 10 to 15 fathoms water, lies with Needle Peak N.N.E., but in going in keep a mast-head look out for 9 ft. patches. Needle Peak, 1,078 feet high, rises in the northern part of the island, H.W. F. & C. 5h. 53m.; rise 4 feet 7 inches. There is a passage and harbour between the island and Mothea Reef which stretches off towards the south. Cobu Rock, 30 feet high, is a good mark for the passage when it bears east. It lies a mile south of south point of Nairai. In the harbour of Venemole, on the west side, known by two small islets joined to Nairai by the reef, which forms a protection against north

winds, vessels of any draught may anchor in 15 fathoms, good bottom, from a quarter to half a mile off shore. Further southward is a 3-fathom bank, the only danger inside the reef towards the Cobu Rock or S.W. passage. A mile north is Venemole Bay, which is quite shallow. Between the western reef and the island is a good ship channel, leading to the large Bay of Corobamba, on whose eastern side is safe anchorage in 13 fathoms, white sandy bottom. The reef extends to the south, and passes between Cobu and Nairai to the south-west. The only danger is a small patch lying E.S.E. a mile from the south end of the island, and a mile north of Cobu Rock.

The town of Corobamba lies at the bottom of the bay. The Cobu Rock is enclosed by Mothea Reef, which here spreads to the width of about three miles, and extends 4 miles further south, where it forms a rounded point.

GOA, Angua, is $8\frac{1}{2}$ miles south-west of Nairai, and 27 miles south-eastward of Ovalau, extends south-east and north-west, $11\frac{1}{4}$ miles, is 6 miles broad, and is surrounded by a barrier reef, ranging $3\frac{1}{2}$ miles off its western point. There are three closely connected, intricate, ship entrances on the north-western side, leading into a sheltered roadstead having 20 fathoms water, and spreading over 16 square miles. The leading mark for the best entrance is the peak of the island (2,345 feet high), bearing E. $\frac{1}{2}$ N. H. W., F. & C., at 6h. 7m.; rise 5 feet.

MUMBOLITHE REEF is $4\frac{1}{2}$ miles south from the extreme of the reef of Angua. It lies nearly north and south, $1\frac{1}{4}$ mile long, and half a mile broad, with no opening. The centre of the basin is in $18^{\circ} 13' S.$, and $179^{\circ} 18' E.$ There are 190 fathoms water at a cable off. It always shows heavy breakers.*

BATIKI is surrounded by a reef, which offers no protection for vessels, and only passages for boats. The island is 750 feet high, dome shaped. The reefs extend one-third of a mile from its shore.

MOALA is of triangular form, about 18 or 20 miles in circuit, and about 2,000 feet high. An opening through the reef on the west side, leads to an inferior harbour. The reef on the north side of Moala resembles that of Totoua, being a collection of sunken and detached patches. The reef on the N.E. extends $2\frac{1}{2}$ miles. After passing it there is a deep indentation in the island, with a broad passage through the reef, leading to a safe and fine harbour; the passage is sufficiently wide for a vessel to beat out, which is seldom necessary, as several passages through the reef westward are safe with a leading wind. The island affords wood, water, and some provisions.

THE TOVA REEF, or Navatu, the *only* danger in the vicinity, about equi-distant from Totoua, Moala, and Vanua-Vatu, is one of the most dangerous outlying reefs in the group, a mile in diameter, and nearly circular; the two former islands are in sight from it, but the latter being low was not seen. At low water it is quite dry. At high water it is entirely covered, and always breaks. Its centre is in $18^{\circ} 39' 31'' S.$, $179^{\circ} 33' W.$ High water, 6h. 8m.; rise 4ft.†

VANUA VATU, $1\frac{1}{2}$ miles long N.W. and S.E., 310 feet high, in $18^{\circ} 22' S.$, $179^{\circ} 24' W.$, lies 18 miles N.N.E. of Tova Reef, surrounded by a reef which joins the shore in some places, and off its north end extends one mile, horn-shaped, where boats can cross at half tide. Small craft are said to anchor here close to the reef in east winds; it is not recommended. Copra.

TOTOYA, in $18^{\circ} 59' S.$, and $179^{\circ} 53' W.$, is circular, six miles in diameter, and 1,248 feet high, is surrounded by a barrier reef of triangular form, the elbows of which are two miles off the S.W., the N.W., and the eastern projections of the island. A capacious ship entrance through the reef on the western side may be found by bringing the southernmost peak (1,159 feet) to bear E. $\frac{1}{4}$ S., leads into a basin of smooth water to the southward, two miles long by one mile broad, perfectly sheltered, with good holding ground, in 25 fathoms water. Wood, vegetables, poultry, and pigs.

H. W., F. & C., 6h. 37m.; rise, $4\frac{1}{2}$ ft.

* Sunken rocks have been reported to lie between Gau and Moola, in lat. $18^{\circ} 24' S.$, long. $179^{\circ} 34' E.$

Metcore Reef, awash, reported on French authority as lying in lat. $18^{\circ} 22' S.$, long. $178^{\circ} 53' E.$, is very doubtful, H.M.S. Pearl having passed over the assigned position without seeing any signs of shoal water.

† The rock placed in $18^{\circ} 32' S.$, $179^{\circ} 25' W.$, was searched for in vain by H.M.S. Alacrity.

Matuku is the southernmost of the Fiji Islands, in 19° 9' S., 179° 44' E. On its western side is Carr's Harbour, stated to be one of the best in the group. The island lies north and south $4\frac{1}{2}$ miles, and $1\frac{1}{2}$ to $3\frac{1}{2}$ miles broad, bounded by a reef awash at low water, projecting one mile off the south-eastern and northern points, but not over half a mile from the general coast line. On the western side of the reef, with the central peak east, is a channel one-eighth of a mile wide, with 30 fathoms water, leading into a basin having 16 fathoms water, with swinging room for two or three frigates, and a shore well adapted for coaling, if ever deemed desirable as a depot for passing steamers. Wood, water, vegetables, poultry, and pigs can be obtained. H.W., F. & C., 6h. 18m.; rise, 5 ft.

The **Island of Viti-Levu**, the largest of the group, is about 80 miles long by 55 broad. Its principal settlements are near Rewa, between Bau and Tova Peak, at Raki Raki, on the north coast; Ba, on the north-west coast; Nandi, on the west coast; and Sarua River and Suva, on the south coast. At Ndronga the natives have much interfered with the settlement.

MBAU, a small island on the east end of Viti-Levu, about a mile in circuit, almost entirely occupied by the native town.

The bay in which it lies is well sheltered by extensive coral sea reefs. The approach is much obstructed by reefs, and (the water being shallow) is impassable for an armed vessel.

There is anchorage here or at Viwa to the north. The channel south of Ovalau is intricate from the island of Moturiki, but fit for ships of considerable draught. Captain Powell, R.N., says the anchorage at Bau should be approached in the morning, and left in the afternoon, as the muddy water near the most difficult places requires the sun to be in a proper position to point out the reefs.

This extensive sheet of water is surrounded by patches, some partially dry a low water, others never uncover. The outer sea reef, six or seven miles distant, effectually breaks the ocean swell, and the inner reefs prevent any sea from getting up.

From Mbau Roads it is 12 or 14 miles to the town of Rewa; it is necessary to take high water to cross the many patches between the roads and mouth of the river.—Captain W. C. Hope, R.N., 1868.

VIWA is a small island of moderate height. H.M.S. Pearl reached Mbau Roads by Moturiki channel, which is south of Moturiki Island. Cagalai Islet, N. 35° E., leads westward of the reefs which stretch S.W. by W., $1\frac{1}{2}$ miles from Leleuvia Islet; when clear a course S. by W. will lead to the entrance between the reefs at Mbau.

From the centre of the eastern and widest channel the west extreme of Leleuvia Islet just overlaps the east extreme of Cagalai Islet, N. by E. $\frac{1}{2}$ E. This channel is generally used, but there are other passages to the eastward.

Two small shoals were seen from aloft in the outer part of Mbau Roads, one near the east side of the eastern channel, the other just outside one of the central passages.

The islets of Tailau, Viwa, and Mbau may be seen six miles off. Bearings of these objects should be taken to determine the vessel's position. The reefs are all covered. In cloudy weather, or when the sun is ahead, it is difficult to distinguish them, and it is better to anchor until the weather clears, or to get a local pilot. A stranger should on no account attempt to reach Mbau unless the reefs can be clearly made out from aloft.

Anchorage in Mbau Roads in five fathoms, with Tailau Island N.W. $\frac{3}{4}$ N.; south extreme of Viwa Island W.S.W.; Mbau Island, S.S.W. The inner part of Mbau Roads is apparently filling up with mud.

Rewa River was ascended to its source by Mr. Macdonald, surgeon to H.M.S. Herald, in 1856. The mountain district is about 36 miles from the mouth. The country through which it passes is thickly populated and well cultivated. There are numerous plantations on the river. On either side are extensive flats of deep black loam, fit for sugar and root crops.

In the delta of the Rewa the Kambia branch is about three cables wide; from the delta to Navuso village, $1\frac{1}{2}$ cables. The river is navigable for ships' boats having steam power to Vunidrala village, 44 miles from the entrance. The Wai-ni-mala branch is very shallow, and full of rapids.

The harbour of Rewa, formed by two small islands Nukulau and Muka-lau, with their attached reefs, has three passages into it. The two southern ones are safe, though narrow; the northern is much obstructed by coral lumps. The port is a secure one. The anchorage, off the island of Nukulau, is about three miles from the mouth of Peale's River, and six from the town of Rewa, which is situated on a low piece of land, which the river, passing on each side of it, has formed into an island.

Nukulau, a low sandy island, covered with wood, on the eastern side has an extensive reef; the western side is clear, and may be approached closely.

The best anchorage is in 12 fathoms, mud, with the outer island barely shut in with Nukulau, two cables' lengths from the shore. The strongest breezes blow from south to south-west. The south passage is entered by leaving the two small islets on the starboard hand; the other more to the eastward, by passing between the two islets, and hauling round the northern one. For quitting the anchorage the best passage is the southern one. The weather point of the reef projects more than the lee one, and makes the water smooth in the passage. A remarkable hummock to the westward, on with the north passage islets, leads into the east passage clear of a patch. The flood tide appears to set to the westward within the reefs. During the summer months there is a breeze off the land in the morning.

Suva.—Ten miles west of Rewa Roads is Suva Harbour, an excellent one, spacious, free from shoals, well sheltered, and with good holding ground, easy of ingress and egress, with an abundance of wood and water. The entrance to it through the reef is narrow and deep.

"Suva Harbour forms a basin $1\frac{1}{2}$ miles north and south, and three miles across. There is a round island near the western shore northward of Park Point. Shoal water extends from the western sea reefs towards Park Point, and encircles round island, extending thence to the next point at the head of the bay.

"Suva Point is low, and cannot be seen from the anchorage. A ledge of rocks extends off Factory Point, and a spit which extends N.N.E. from the eastern sea reef seldom shows even from the mast head, on account of the discoloured water discharged by the three rivers into the harbour. Caution is therefore necessary in rounding the spit. The sand-bank which lies about a mile N.W. by W. $\frac{1}{4}$ W. from the storehouse breaks slightly at low water.

"The small island Namuka, three miles south-west of Park Point, is visible 10 miles, and indicates the entrance. The factory on Factory Point can be seen 10 or 11 miles. A peculiar yam-shaped mountain stands a little west of the entrance; inland, farther westward, is a high mountain, with three pointed peaks.

"To enter, bring Bega Island to bear south-west by south, and steer north-east by north, which leads up to the entrance. The passage between the reefs is about three cables wide, and appears to be clear of dangers. Steer N. by E. until a large store-house with a flagstaff in front bears E. by S. $\frac{1}{4}$ S., then for the store-house between the spit extending from the eastern reef and a sand-bank in the northern part of the harbour, and thence to the anchorage.

"The anchorage is good and easy of access, there is room for several vessels in 8 to 15 fathoms. The Pearl anchored in 10 fathoms, with the flagstaff S.E. by E. $\frac{1}{2}$ E., and the left extreme of Bega Island S.W. by S. Inside this the water shoals rapidly, but farther southward, off the factory bluff, a berth in seven or eight fathoms, soft mud, can be obtained. There is said to be good anchorage near the round island northward of Park Point.

"It is said to be H.W. F. & C. at 6h., spring rise, six feet."—Lieut. Hoskyn, H.M.S. Pearl, 1874.

NAMUKA ISLAND, three miles to the south-west of the entrance of Suva Harbour, and inside the shore reef, is small, and covered with trees. A short distance south-west of the Island is an opening through the reef, with apparently deep water, leading to Namuka Harbour. A small river empties into the harbour, at the head of which is a village.

South-west of Suva, off the south coast of Viti-Levu, are the islands of Bega and Namuka, surrounded by reefs.

Bega, the largest, is five miles long by three miles wide. It rises into

two very prominent peaks 1,289 feet high. On its north side is Sawau Harbour, two miles deep and one mile wide, with a narrow entrance. It has good anchorage in 4 to 10 fathoms, mud. On its west side is Elliott's Harbour, not so deep as the former, but more open at the entrance, and surrounded by equally high land. On the left of the entrance is a white sand beach. There are two small islands near Bega, one to the south named Stuarts, the other to the east, Elizabeth. The reef which surrounds Bega Island extends 12 miles to the south-west of that island; its south-west edge is 6, and its west $5\frac{1}{2}$ miles from Nanuka (query Yamthu) which is within the same reef as Bega. The reef on the north-west side was found to contain many ship passages. North of it is Bird Island, and the reef off this part of Vitu-Levu nearly joins that of Bega. To the north and north-west of it are Whippy and Granby Harbours, which afford good shelter.

NAVUA ANCHORAGE, eastward of the entrance to Navua River, has good holding ground in sand and mud, but is of small extent inside the western spit. When the east extreme of Bega bears S. 1° E., steer to the north-west, and keep close round the south extreme of Nuku Wakaia Reef until the vessel is inside a spit which extends N. by E. from Navua Reef; then steer westward, and anchor in six fathoms, with Navua Point in line with the centre of Namuka, S.W. $\frac{1}{4}$ S.; the east extreme of Bega S. $\frac{1}{2}$ E.; the break on Western Reef, S.E. by E.

Navua Point is low. The entrance to the river is westward of the point. There are several shoal spots in the west and south-west part of the anchorage; also a dangerous one of six feet water, 100 yards outside the fringing shore reef, and 340 yards north-west from the berth recommended.

The channel between Bega Island and Navua Reefs, about two miles wide near Storm Island, appears to be clear of dangers; several tide rips and much discoloured water were observed when the Pearl passed through, but no soundings were obtained with a hand lead. At high tide the water breaks on the northern Bega Reefs, and the shore reefs can only be known by a slight ripple. Between Navua and Sarua, 13 miles westward of it, the shore reef extends two to three miles from the coast, with a passage inside used by small vessels.

Red Bluff is 23 miles W. by S. from Navua anchorage, and seven miles from Granby Harbour. The coast thence continues high for about 12 miles westward, then gradually lower for six miles, till near some conspicuous sand hills which slope down to the sea, terminating in a point about 80 feet high.

SARUA HARBOUR.—In proceeding eastward, after passing Granby Harbour, the island in Sarua Harbour, composed of two hills of moderate height, with a low gap between, will be seen clear of the main. On its east side is an opening in the reef leading into Sarua Harbour, sheltered by the sea reefs, and anchorage in 15 fathoms, with the low gap in the island W. $\frac{1}{4}$ N. A few miles east of Sarua Harbour is a large opening in the reef, with a small sand islet on its eastern side.

Siga Toka River is 16 miles W. by N. from Red Bluff; the water is much discoloured a considerable distance from its mouth, and has the appearance of shoal ground, particularly when the sun shines on it.

NDRONGA HARBOUR lies five miles W. by N. $\frac{1}{2}$ N. from the sand-hills already mentioned. Inside the shore reefs on either side of the harbour are two small islands, Kaba and Ya-nu-ca, by which the harbour may be known. Kaba Island, on the western side, is 40 to 60 feet high, thickly wooded. Ya-nu-ca Island, on the east side, is 60 to 70 feet high, thickly wooded at the south part; a long, low, sandy point extends from its north side. The best landing places are at the east and west extremes of the beach, or, when the tide is sufficiently high, in the creeks.

At low water a part of the reefs is exposed. There are heavy breakers on both sides of the entrance, particularly on the western reefs. The course between the reefs is N. 1° E. A dangerous coral spit, having 9 to 15 feet water, which breaks at low tide, extends eastward from the elbow of the western reef into the channel, contracting it to two cables. The eastern reefs are steep-to. The water shoals gradually from 15 fathoms a short distance inside the reefs to the anchorage in five and six fathoms, farther in the soundings quickly decrease to four and three fathoms.

With on-shore winds heavy rollers set in; the bottom is hard sand; the outer reefs afford but little protection. The Pearl anchored in five fathoms with the extreme of Kaba Island S.W. by W. and W.N.W.; and Cuvu Village E. by N.: a better berth would be half a cable eastward.

Between Ndronga Harbour and Likuri Island, six miles westward, are two openings in the reef, one reported navigable, with anchorage inside. Likuri Island is low and covered with cocoa-nut trees; just westward of the island is an opening in the reefs, with anchorage inside. Tuva River discharges into it; boats can ascend the Tuva six miles.

The route inside the Barrier Reef, which surrounds the greater part of Viti Levu, may be safely taken in clear weather, when the sun is well above the horizon and astern; the vessel should be coned from the mast-head. There are but few sharp turnings, none that offer any difficulty to a handy steamer.

The pilots are accustomed to small vessels only, and navigate entirely by the eye; it is necessary to take a new pilot for each part of the coast.

THE NAVULA PASSAGE is 15 miles north-west of Ndronga Harbour, and about six cables wide, with apparently no dangers near mid-channel. The course through is north-east by east. From the Pearl's mast-head several small shoals of 6 to 12 feet were seen off the eastern reef. A shoal spit extends E.N.E. half a cable from the inner edge of the western reef. A break was seen about a mile north of the eastern extremity of the western reef. The sea breaks heavily on the outer parts of the reef. A reef with a stone above water lies S. 88° E. 7 miles from the north extremity of Malolo Island.

Nandi Bay.—After clearing Navula Passage, the course, to Nandi Bay, inside the reefs, is N. by E. $\frac{1}{2}$ E., the west extremity of the mainland being kept on the starboard bow. When Iakuilau Island (low and sandy, with a few cocoanut trees), opens, steer to keep it just clear on the starboard bow. As soon as Iakuilau is passed steer between its fringing reef and a small breaking reef $1\frac{1}{2}$ miles N. $\frac{3}{4}$ E. from it. A small coral lies just northward of the fringing reef of Iakuilau. No soundings were obtained by the Pearl until nearly halfway through, when 7 fathoms were struck, they then gradually decreased to 4 fathoms on the mud flats off Nandi River.

An extensive shoal is situated in the eastern part of Nandi Bay, but there is a good passage of 5 fathoms between it and the outer one lying to the westward.

Vessels may anchor off the plantation of Vunda in $3\frac{3}{4}$ fathoms. The soundings decrease gradually from 8 to 4 fathoms, stiff mud, good holding ground.

MALOLO ISLAND, off the western end of Viti Levu, consists of Malolo and Malolo-Lailai, separated by a narrow and rocky interval. Northward of Malolo is a group of small islets, the Underwood Group.

North-west of Malolo are the Hudson Isles. The great sea reef does not appear between them and the southern islands of the Asaua group. Northward of Vunda, on the coast of the main island, is the Ba Passage. The town of Ba is 14 miles further on. The land close to the shore is low. Ten miles further on is the town of Dongaloa, on the coast. Here the high lands approach nearer the shore.

Spieden, Waldron, Linthicum, Smith, Henry, Reynolds, and Bateman Islets, are low, sandy, and wooded. Vunda is a sand-bank without trees. Vanderford is a little larger bank, with a small clump of trees on the north end.

INNER CHANNEL.—Passing northward from Nandi Bay, a berth of half a mile should be given to Vie Tonga Point; a course north-east by north should then be steered until the island northward of the point is approached, when the course will be N.N.E. A shoal lying N.N.W., $1\frac{1}{4}$ mile from Vie Tonga Point, is the south-eastern one of a number extending as far as the eye can see from aloft; the sea breaks over many parts of it.

The first island north of Vie Tonga Point is skirted by a reef extending a quarter of a mile off shore. The passage here is about a mile wide. The supposed position of a shoal three quarters of a mile N.N.E. from the last-mentioned island was passed over by the Pearl.

BA PASSAGE is narrowed by the reefs extending off the two islands

(Votia and one of the southward) which form the passage. The course through is E.N.E., with five to seven fathoms; the shoals could be clearly seen from the mast-head. Off the point on the mainland south of Votia Island two small wooded islets appeared to form part of the point; the outer one bears south from Votia.

There is another passage half a mile wide on the west side of Votia Island, fringed by a reef to a considerable extent.

From Ba Passage the course is N.N.E. till abreast of Cilau Point, off which a reef extends northward one-quarter of a mile, with a lump of stones above water three cables farther north, and a cable beyond is a dangerous patch, with apparently four feet water.

On the inner of the two Tabooa Reefs is a sandy island, Malebu, with stunted coconut trees. The ship channel between Malebu Reefs and those off Cilau Point, is very narrow at the turning, but presents no difficulty to steam or to a fair wind, provided the reefs can be seen from aloft. From Cilau Point to Ba are so many sunken dangers that the channel should not be attempted unless the sun is in a position favourable for seeing the reefs. Anchorage can always be obtained off this part, but the anchorages on the north coast of Viti-Levu are indifferent, and should be avoided during the hurricane season.

East of Ba Point a mud flat extends two or three miles off shore; the lead will guide in approaching it, but the water shoals quickly from six fathoms. Between the flats and the barrier reef there appeared to be no danger. After rounding the flats alter course for the anchorage off Ba River; when the entrance bears S. 1° E. steer for it and anchor in six fathoms with Dongaloa Island N.E. by E. $\frac{3}{4}$ E. The water from the river reaches the anchorage at half ebb.

Two remarkable hummocks on the outer range of hills, on the west side of Viti-Levu, S. $\frac{1}{2}$ W., lead to the entrance of Ba River, which is difficult to recognise from seaward. It is only navigable for vessels of light draught.

Dongaloa consists of a reef with a number of sand-banks on it awash at high water neaps, and extending much farther west than was formerly supposed. There are a few sunken patches near the south side of the reefs. From the anchorage off Ba River steer off shore a little to clear the mud flats. Off the third point eastward from Dongaloa a reef extends under water $1\frac{1}{2}$ cables. Between this point and Vatia Island is a small island 80 feet high, covered with trees, having a bight with shallow water to the westward. The channel between the mainland and the barrier reef is $\frac{1}{2}$ to $1\frac{1}{2}$ miles wide, apparently clear of dangers.

VATIA ISLAND, 600 feet high, until close-to, appears like a part of the mainland. A reef awash at low water extends north from it. Eastward of Vatia, between it and the long reef that extends off shore from Tavua River, are a number of sunken patches. After rounding Tavua Reef, steer southward between the latter and the barrier reef for the anchorage off Tavua River. Anchor in nine fathoms, with the mouth of the river S. $\frac{1}{2}$ W., about a mile from the nearest shore.

The Island of Malaki adjoins the northernmost point of Viti-Levu, is 800 feet high, and is divided from the main island by a narrow strait, off it is a passage through the sea reef. Some plantations are established on this part of the coast, which is named Raki-Raki.

CHARYBDIS REEF.—An extensive reef just awash, crescent-shaped, in a N.E. and S.W. direction. Its centre lies W. by N. $\frac{3}{4}$ N. about nine miles from the north point of Annan Island, and about the same distance N. by E. from the anchorage of Raki-Raki.

INNER CHANNEL.—From Tavua anchorage steer towards the barrier reef and along its southern side, passing north of a breaking reef, two miles north-east of Tavua. The channel—northward of Malaki Islands, and of the three small islands westward of it—appears clear of hidden dangers; vessels should keep midway between the outer reefs and those extending from these islands. The channel abreast Tovu-Leilei, the first island west of Malaki, is two cables wide. From a distance this part of the passage appears almost blocked by the reef.

A little north of the fairway, abreast Malaki, is a patch of $2\frac{1}{2}$ or 3 fathoms, and a reef extends three-quarters of a cable from the north side of

Malaki: the passage north of this island is $1\frac{1}{2}$ cables wide, narrowed by numerous detached knolls near the south edge of Barrier Reef. It is better to keep near the island reefs, as they are steep-to.

Anchorage off the west end of Nananu-ira Island in 11 fathoms, mud, good holding ground, with its south point S. 55° E.; the water shoals quickly inside this. There are several sunken reefs westward of the anchorage; a good look-out should be kept from aloft.

southern point of Viti Levu Bay, which is five miles deep and one mile broad.

From this anchorage the inshore passage leads to Nagilo-gilo Head, the Off the centre of Viti Levu Bay is a six-foot patch, which breaks with moderate breezes; the best passage is westward of it, as the ground is clear of dangers in-shore round the bay till close to the beach; when past the patch steer S.E. $\frac{1}{2}$ E.; seaward are said to be an immense number of reefs. There are several high bights in this part of the coast, with secure anchorage for small craft.

From the southward Nananu Passage may be made out by bringing Nagilo-gilo Head to bear S.E., and steer N.W. till the islands are approached.

Three to five miles S.E. of Nagilo-gilo Head is a small island skirted by a reef, pass just outside it, then bring the island in line with Nagilo-gilo Head N.W., and steer S.E.; this mark leads clear of dangers till two miles from the fringe reef north of Tova Peak. Then haul out so as to clear the reef, and round it at three cables distant. Steer E.S.E. until Tova Peak bears W.S.W., when alter course for the north part of Ovalau Island bearing about E. $\frac{1}{2}$ S., passing through a labyrinth of shoals. Pass southward of Naingani, off whose south side a reef extends $1\frac{1}{2}$ cables southward. There are two shoals three-quarters of a mile westward of the same island.

Wakaia, Mokungai, and Mokundra, lie N.E. of Ovalau (from which they are visible), separated by a strait of ten miles; they are within the same reef. Wakaia is the southernmost. There are several openings through the reef near Wakaia, on its eastern side, not recommended except for small vessels. The entrance on the S.W. side, leading to Flying Fish Harbour, is quite narrow. On the N.W. point of the island is a stone landing place, and near it a flagstaff. On the west side of Mokungai, the island next northward, is a small harbour, formed partly by reefs and partly by the little Island of Mokundra. Wakaia is 596 feet and Mokungai 876 feet high. Wakaia is well stocked with cattle, etc.

The reefs extend from these islands with few interruptions to the south shore of Vanna-Levu; just westward of Mokungai is the Mokungai Passage, difficult at times from the tides; the flood runs North and East, the ebb the reverse.

The Daveta Loboni Passage, on the N.E. side of the reef surrounding Mokungai Island, is contracted to three-quarters of a cable in width by three sunken coral knolls with apparently not over 12 feet on them.

"This part of the group is dangerous in dark nights and uncertain weather, no anchorage nor shelter being within reach, nor can any of the passages between the long belt of reefs which extend from the south of Vanna-Levu to the south side of Viti-Levu, an extent of 60 or 80 miles, and which forms a lee shore, be attempted at night, these difficulties being increased by the uncertain set of the currents, which are often strong. It is necessary, indeed indispensable, that to sail amongst the reefs and shoals of these islands, with any degree of safety, the day should be clear, the sun bright and behind the ship, and the time of low water chosen, if possible, when they can always be distinctly seen, and with care avoided; when the sun is ahead of the ship, or the day becomes dull, she should be at once anchored, as the shoals can no longer be distinguished; this remark of course attends vessels navigating inside the different sea reefs, for without them there is no anchorage."—Captain Worth, R.N., H.M.S. Calypso.

The Island of Ovalau, eight miles north and south, by seven miles east and west, is high and rugged throughout. Its harbours are formed by reefs. That of Levuka, on its east side, is safe, good holding ground, and easy of access; vessels can always procure wood and water.

The Peak of Andulang is 2,070 feet high; the highest, Dille-Ovalau, about 200 feet higher.

The harbour of Levuka (says Captain Worth) is the most convenient and central anchorage in the group, with its entrance so clear and attainable that no accident can happen with common caution, and is the only harbour where water can be easily obtained. The anchorage is sheltered by a reef parallel with the shore, distant from it nearly half a mile, which keeps the water always smooth.

HARBOUR LIGHTS.—The lights are *fixed*; the inner (upper) light *white*, visible 10 miles, is placed on a hill behind the town; and the outer (lower) one *red*, visible five miles. The beacons from which the lights are exhibited are painted *white*, each with a *red* diamond; position, $17^{\circ} 40' 45''$ S.; $178^{\circ} 49'$ E. The lights by night, and the beacons by day, in line, lead through the middle of the south entrance passage into the harbour. They are E. $\frac{1}{4}$ N. and W. $\frac{1}{4}$ S., 73 yards apart. ("There is a *red* beacon on the north end of the south reef, on the southern side of the south entrance."—Captain MCKAY.)

A *cash* beacon, chequered black and white, has been erected on the centre of the reef in Levuka harbour, abreast of the south entrance. A *chequered* buoy has been placed on a patch about a cable in extent, having 10 feet on it at low water, situated $2\frac{1}{2}$ cables S.E. by from Observation Point. A *red* buoy has been placed on a seven-foot patch in the north entrance, Waitovu Passage, to Levuka harbour, four cables S.E. by S. from the south-west extreme of the reef forming the north side of the entrance; and a *chequered* buoy on a nine-foot patch $1\frac{3}{4}$ cables S.E. $\frac{3}{4}$ S. from the south-west extreme of the reef. The best passage is north of chequered buoy.*

Off Waitovu there are several small shallow patches of coral about one cable from the shore. H.W. F. & C., Levuka harbour, at 6h.; springs rise 5 feet, neaps $2\frac{1}{2}$ feet.

A coral patch off the rivulet Mbu-re-ta lies W. by S. $\frac{3}{4}$ S., two-thirds of a mile from the entrance of the rivulet, or E. by N. a mile from north point of Moturiki.

MOTURIKI is almost in contact with Ovalau, south of it. The reef surrounds both; there is no passage between. A large square rock lies midway between, Laudolib. Moturiki is three miles long and one broad. Two small islands, Leluvia and Thangala, lie south of it. Between these and Moturiki is the entrance to the bay of Bau, the Moturiki Passage.

Two sunken patches were seen by H.M.S. Brisk lying from about N. by W. to N.N.W., half a mile from Leleuvia Island; caution is therefore necessary when passing through the Moturiki Passage.

MOTURIKI PASSAGE is of considerable importance $1\frac{1}{2}$ miles long by half a mile wide. Some remarks on its navigation are given on page 244. An east by south course leads through, when Black Peak, on Viti-Levu, can be seen, it is a good leading mark. The tide sets strongly through, the flood westward, or in, the ebb eastward or out. There is safe anchorage either under Leluvia or Moturiki on their west side in 7 to 12 fathoms; a good harbour exists on the Moturiki side by entering through a narrow channel before reaching Thangala Island. It may be known by a large rock on the reef. After getting through the reef there is anchorage in 7 to 10 fathoms, sand.

Vatu-Lele, lies south of Viti-Levu, it is well wooded. The north part is 70 feet high, it slopes gradually to a low point at its south end. There is a narrow shore reef on its western side, but off the eastern shore a reef extends two or three miles, forming a bow. Seven miles east by south from its south point is a dangerous reef awash extending 300 yards north and south, by 150 yards east and west. Wilkes calls it the Flying Fish Shoal.

Kandavu, the south-westernmost of the Fiji Islands, is 25 miles long, and mountainous throughout its whole length, except a small part at its

* A coral head with $3\frac{3}{4}$ fathoms lies S 41° E. $6\frac{3}{4}$ cables from Observation Point. Clearing Marks: The beacon on half-tide rock in line with right extreme of Ovalau, N.N.W. $\frac{1}{4}$ W., clears the Horses Heads and patches off Nasova. The buoys in north entrance are not to be depended on. The *chequered* buoy has been washed away; the *red* buoy has drifted three-quarters of a cable southward.—H.M.S. Barracouta, 1876.

centre near Malatta Bay. It is well covered with pine timber. Tavuki Bay, on its north side, is in $19^{\circ} 3' S.$, $178^{\circ} 6' E.$, by H.M.S. Harrier. On its west end is Buke Levu, or Mount Washington, 3,800 feet high, in the form of a cone, the sides descending with a direct inclination from the summit to the sea.

TAVUKI, or Tabuca Bay, Capt. Hope, R.N., of H.M.S. Brisk, says that Tavuki is an anchorage not to be recommended; the bay is full of coral patches of various depths, and subject to sudden gusts of wind from the high land.

Malatta Bay is small and offers safety to a few vessels for temporary anchorage. The island is here nearly divided into two by a low and narrow isthmus. An extensive reef faces the north-west part of the island, rounding out to the westward from the north-west point, north of Malatta Bay, and then southward, joining the shore again north of Tavuki (chart), as this is ordinarily on the lee side when the water would be smooth, it is doubly dangerous. Northward of the north-west point of the island is the only detached reef off its northern face. Off Cape Bligh, its east end, is the island Ono, 80 feet high; between it and Kandavu is a good and well-protected harbour. To the north is a cluster of eleven small islands, all situated in the Great Astrolabe Reef. From Ono this reef trends nearly north. Its east side is quite unbroken, and extends in a sweep round Oumbenga, joining Kandavu. (According to the chart it continues its southerly and south-westerly trend past the east extreme of Kandavu.) On its west it is much broken, and has several safe passages through to the group. At the north end of the reef is a clear passage through it. The water within is very deep, and whales were seen inside. The reef is not only dangerous from its extent, but from the strong currents, generally to the eastward, which prevail here.

NGALOA OR GALOA BAY lies in the centre of the eastern side of Kandavu. The following is by Lieut. Hosken, H.M.S. Pearl. A dip in the land, just north-east of a remarkable gap in Kandavu Hills, which almost divides the island, will point out the position of the bay, if Ngaloa Island, which divides it into two portions, cannot be made out. The latter being under high land, often cannot be seen till within six or eight miles of the entrance.

Ngaloa Harbour is protected from seaward by the fringe reefs. Ngaloa Island, $1\frac{1}{2}$ miles in extent, is in the north-west part of the harbour, forming to the north-eastward North Bay, to the westward Inner Harbour, and on its south-west side Outer Anchorage.

North Bay is about two miles east and west, and one mile broad, with 19 to 20 fathoms near the centre, sand and coral. Inner Harbour is about half a mile in extent, with $4\frac{1}{2}$ to 6 fathoms, mud. Outer Anchorage has 16 to 20 fathoms, mud. On the west side of Outer Anchorage a mud flat, fringed by a reef, dries 400 yards from the Kandavu shore, having six fathoms close to the edge in some parts, with patches of two and three fathoms at three-quarters of a cable, and six to nine fathoms nearly three cables from the reef. Wood Shoal, with rocks awash at low water, lies on the south-east side of Outer Anchorage, bearing S.E. $\frac{3}{4}$ S. $4\frac{1}{2}$ cables from south point of Ngaloa Island.

The Main Channel into Ngaloa Harbour, formed by Esk Reef on the north and Pearl Reef on the south side, is three cables broad, with 40 fathoms near the centre. At the inner entrance of Main Channel, and N.W. $\frac{1}{2}$ N., two cables from the north-west end of Pearl Reef, lies McGregor Patch, dry at low water, marked by a white buoy on its south side.* Between McGregor Patch and the east extreme of Ngaloa Island are several spots of two and three fathoms, with six to eight fathoms close-to. The leading

* Additional buoys and beacons in entrance and harbour:—Entrance: A *red* buoy on south edge of Esk Reef, a *red* buoy on north edge of Macgregor Patch, a *black* buoy on north edge of Pearl Reef, a *red* buoy with black and red perch on south edge of Macgregor Patch. Harbour: One iron beacon with triangle, *red* and *white* in horizontal bands on east edge of Wood Shoal, a *red* buoy on west edge of Wood Shoal, a *red* buoy on the $1\frac{1}{2}$ -fathom patch, which lies W. $\frac{3}{4}$ N. five cables from outer beacon off Ngaloa Island. The buoy off the outer beacon has been removed. The present lights on the beacons give a dim light. New ones are ordered.—H.M.S. Barracouta, 1876.

mark through main channel from seaward is the beacon on the southern hummock of Ngaloa in line with the beacon on Kandavu, bearing W. $\frac{1}{4}$ N.

Boat Channel, on the east side of Esk Reef, is 300 yards long and 50 yards broad, with $3\frac{3}{4}$ to $4\frac{3}{4}$ fathoms. Schooner Channel, an opening in the fringe reef one quarter of a mile eastward of Boat Channel, is 150 yards broad, with 10 to 12 fathoms near the centre. On the north-east side of the inner entrance of Schooner Channel is a patch of $1\frac{1}{2}$ to 3 fathoms. The left extreme of Anda Tavie Island, N.N.W. $\frac{3}{4}$ W., leads westward of this patch. H.W. F. & C. in Ngaloa Harbour at 6h 38m.; springs rise 5 feet 3 inches, neaps 4 feet 5 inches. The buoys in Ngaloa harbour are indifferently moored, and not to be depended on, the beacons are temporary structures.

From the eastern part of Ngaloa Bay on the south-east side of Kandavu Island, a fringe reef extends north-eastward about four miles, when it stretches off in a long prong abruptly southward, off the outer end of which the high peak of Ngaloa Island bears S. 81° W., $8\frac{1}{2}$ miles; thence, after a break one mile wide, the reef trends north-easterly towards Koro-Levu harbour, which is 10 miles eastward of Ngaloa Bay. An E. by N. course from off the entrance to Ngaloa harbour will lead clear of all reefs on the south side of Kandavu Island.

From the east extreme of Kandavu the reef takes a more northerly direction for nine miles, to abreast the north-east point of Ono Island, from which the reef stretches off eastward nearly five miles; thence it continues to abreast of North Rock 13 miles northward, where a prong of Astrolabe Reef forms a prominent elbow, $1\frac{3}{4}$ miles eastward from North Rock. From this elbow to the north extreme of Astrolabe Reef is about $2\frac{3}{4}$ miles in a north-westerly direction. During the visit of the Pearl the sea broke heavily over the eastern edge of Astrolabe Reef; but over the long north part there was only a slight ripple, and that not seen until within a mile of it, rendering this part of the Astrolabe Reef dangerous at night.

North Rock, about eight feet high, is situated in a lagoon $1\frac{1}{2}$ miles within the north extremity of Astrolabe Reef. The northern portion of the top of the rock is white.

A deep landlocked harbour, Ninderi, is on the north side of Kandavu Island, six miles from its east point. Along the north shore of Kandavu a barrier reef is reported two miles off the land.

Ono Island, three miles northward of the east end of Kandavu Island, is 400 feet high. The anchorage, Babia, south of Ono Island, is said to be good. The entrance is from the westward.

Yasawa, or Leeward, Group, the westernmost range of the Fiji Group.

VOMO, the south-easternmost of this group, is famous for its turtles, which abound from December to March. The southern half of the island has a high, narrow, almost perpendicular bluff; the northern half is sand, covered with bushes, resorted to by pigeons. It is two miles in circuit; off its north-west end is a detached rock, Castle Rock. There is anchorage, but not well protected, for a small vessel.

Twelve miles west from Vomo is a group of small islands, Davis, Knox, and Totten Islands. The interval between is occupied by a continuous line of reefs.

WAIA.—North-west of Vomo is Waia, the highest and most broken of of the Yasawa Group, its peak being 1,641 feet high. Connected with it southward are Waia-lilai and Waia-lilai-thake.

VAVITI, north of Waia, the largest of the group, is 954 feet high. There is no anchorage. This and the islands northward have passages between them, and are little incommoded by coral reefs. Southward of Vaviti are the small islands of Eld, Foxe, Agate, and Sinclair.

YASAWA, the northernmost of the group, is narrow, and about 10 miles long. Towards its southern end is a peak Tau-tha-ke, 781 feet high. The southern bight is well protected, except from the north-west, by the small island of Ovawo, and two small islets. Between Yasawa and Vaviti are a number of smaller islands, with clear passages between. Off its north point are several small islets.

BIVA, the westernmost of the group, lies 12 miles west from the south point of Vaviti. It is a long, low island, with two smaller ones connected

with it, covered with cocoanut trees, surrounded by a reef, which extends three miles south of it. It affords no anchorage. Eight miles north of it is the Porpoise Shoal.

AWAKALO, or Round Island, though separated by a clear channel from the Yasawa Group, is the only islet in its neighbourhood. It is 500 feet high, dropping at each end. An extensive patch lies to the eastward.

Off the Yasawa Group to the westward lie the extensive Ethel Reefs. See chart.

“WINDS AND WEATHER.—In the Lau or Eastern Group, between May and November, 1878, the wind blew strongest and with most persistence from S.E. by E. and E.S.E., occasionally rising to the force of a moderate gale in September and October. Very little rain fell. Strong easterly winds are generally accompanied by haze, which, however, permits of breaking reefs being seen three to four miles off. The barometer was highest for strong E.S.E. winds and lowest for north-west winds. After two or three days calm or light winds with westing in them, the south-east winds sometimes set in with a squall, from south or S. by W. quickly veering.

“CURRENT.—No current worthy of mention was observed, except in the lagoon passages, where it was nearly always tidal; and in the neighbourhood of reefs, where it is probably not regular nor exceeds half a knot an hour. During strong south-easterly winds there is a surface drift, but it ceases when the wind moderates. In the summer months there is as much probability of an easterly as of a westerly set. In the lagoon passages the tide runs as much as two knots an hour.”—From H.M.S. *Alacrity*, 1879.

North of Fiji, and eastward of the New Hebrides, lie a number of scattered islets and shoals, between 10° and 20° S., and which do not belong to any of the large archipelagoes. North of them are the Ellice Islands.

ISABELLA SHOAL, 16 fathoms, coral bottom, is in $12^{\circ} 25'$ S., $177^{\circ} 15'$ W. It extends east and west as far as the eye can reach.

THE BAYONNAISE BANK, soundings 16 fathoms, coral, in $12^{\circ} 9'$ S., $179^{\circ} 44'$ W.

Rotumah is about four or five miles from north to south. The south end terminates in a low point, with a conical hill. Two islets lie two miles from the north end. Atangota Island, near the east point, is in $12^{\circ} 32'$ S., $177^{\circ} 13'$ E.

Captain Hope, R.N., gives the following account of the two roadsteads on the north side :—

Lee Harbour, so called, is an open bay, $1\frac{1}{2}$ miles from the west end of the island; is well marked by a high wooded bluff, 600 feet high, on its western side, with a red sandstone face to the water's edge. No fresh water, landing difficult. The Brisk anchored in 15 fathoms, with east point of bay N.E. $\frac{3}{4}$ E., and centre of Emery Island W. by N. $\frac{1}{2}$ N. Emery Island, the easternmost of a chain of islets lying north-west of Rotumah, is high. There is a clear channel between these islets and Rotumah.

North-east Roadstead is five miles eastward of Lee Harbour, at the north-east point of the island, close westward of two islets off the point. The Basilisk anchored in $9\frac{1}{2}$ fathoms, with Outer Islet N.E. by E., Emery Island W. $\frac{1}{2}$ N. in smooth water, with a strong trade blowing; the ship was watered in bulk from good wells and a smooth sandy beach. When the trade wind may be depended on north-east roadstead is to be preferred to Lee Bay, in making which avoid closing the eastern point, as off it is an extensive reef. There is also anchorage with north and west winds off a village at south-east end of island. It is said to be one of the best islands in South Pacific for cocoanuts. From Auckland to Rotumah, it is best to go to the east of Fiji.

EAGLESTON REEF, 40 miles east of Rotumah, a shoal of unknown extent, in about $12^{\circ} 30'$ S., $178^{\circ} 0'$ E.

Louisa Bank is said to be in $11^{\circ} 45'$ S., $175^{\circ} 52'$ E.

HAMOND REEF, in $15^{\circ} 32'$ S., $175^{\circ} 20'$ E., is probably the same as Underwood's Reef, placed in $15^{\circ} 42'$ S., $175^{\circ} 18'$ E.

CARTER'S REEF, stated to be in $15^{\circ} 42'$ S., $176^{\circ} 28'$ E. Also a dangerous reef in $15^{\circ} 40'$ S., $175^{\circ} 58'$ E., breaks with heavy swell; depth $7\frac{1}{2}$ fathoms.

A reef is said to be in $18^{\circ} 10'$ S., $175^{\circ} 10'$ E.

Charlotte Bank, of 15 fathoms, in $11^{\circ} 15' S.$, $173^{\circ} 12' E.$ The Pandora reef is in $12^{\circ} 11' S.$, $172^{\circ} 7' E.$

Fataka, or Mitre Island, two miles long, north-west and south-east, steep, and covered with wood, in $11^{\circ} 56' S.$, $170^{\circ} 20' E.$

Anouda, or Cherry Island, is placed $11^{\circ} 37' S.$, $169^{\circ} 40' 30''.$ Its north end is 350 feet high. A rock lies 300 yards off the north end, and a bank of 19 to $12\frac{1}{2}$ fathoms extends 4 miles in a north-westerly direction. It has anchorage on it, coarse white sand. From the south-west side of the island another spit extends off. A mile from its southern end is a rock a few feet above water, joined to the shore by a rocky bank. A quarter of a mile outside this is an apparently isolated sunken rock.

Strathmore Shoal.—Reported with 4 to 5 fathoms over it. 150 yards in extent, in about $11^{\circ} 9' S.$, $170^{\circ} 42' E.$ (Is not marked on chart.)

Tucopia, or Barwell Island, is 3 miles in diameter, in $12^{\circ} 21' S.$, $168^{\circ} 43' E.$ About 3,000 feet high.

DETACHED ISLANDS AND SHOALS BETWEEN THE EQUATOR AND LATITUDE $10^{\circ} S.$

Following the previous plan, in this belt of latitude we commence to the westward of the Marquesas Islands.

Caroline, or Thornton Island, is 7 to 8 miles long N.N.E. and S.S.W., and 2 to 3 miles wide, well covered with cocoanut and other trees, visible 16 to 20 miles. It consists of many islets, encircling a lagoon. The reef on the windward side breaks, except at the north-east point, to a distance of a mile, on the south side $1\frac{1}{2}$ mile; and is dangerous to approach at night. The reef is close to the islets on the west side, and no breakers were seen off the north-west point. "An entrance to the north-east, anchorage inside, patchy; trade, shell."—Captain Murray. Its latest assigned position is $9^{\circ} 54' S.$, $150^{\circ} 6' W.$

Vostock Island and Flint Island have been described on page 226.

Malden Island, 30 feet high, visible seven miles. The reefs off the windward or north-east and south-east end stretch seawards some distance; the north-east is the most dangerous point. Landing on the east side is rarely possible. The west side is quite safe, the reefs off the north-west and south-west ends only extend a few cables. The Guano Company have laid down moorings and buoys, and run out stages as far as possible, so as to give every facility. 100 yards from the shore, the depth was 70 fathoms white coral. There is no fresh water, no cocoanuts. When the sun is north of the line, during the period of E. and E.S.E. winds, the northern side of the island is practicable, as well as the south-west side; when the sun is south of the line, during the period of the true north-east trade, the south side is practicable. The loading of guano is carried on at all times, except during a few days at full and change of the moon. The tide rises $1\frac{1}{2}$ feet, lat. $4^{\circ} 1' S.$, long. $154^{\circ} 57' W.$

Starbuck Island.—It has been very vaguely placed on the charts, and to this cause probably is owing the many wrecks which have taken place on it. No anchorage; landing difficult: the guano establishment in good order, but deserted. It is low, and not visible over seven miles. It is four miles long east and west, $1\frac{1}{2}$ miles wide, and surrounded by a narrow, steep reef nearly half a mile off shore, except off the east side, where it extends further. The north and north-west sides are the only practicable parts for landing. It had been visited for guano, then abandoned, but subsequently revisited by the company working Malden Island. Near the north-west point, quite close to the shore, the depth is 15 fathoms, 85 yards further out is 130 fathoms and upwards. Lieutenant Chauviniere considers "the approach to these low islands (Malden and Starbuck) especially from the eastward, must be made with great caution, owing to much of the shore being awash, and to the prolongation of the reefs in that direction. The current also is very strong; between Malden and Starbuck it ran to the

westward 32 miles in 24 hours; in the vicinity of the latter island it has been estimated at 43, 51, and even 56 miles W.S.W. in 24 hours." Lat. $5^{\circ} 36' S.$, long. $155^{\circ} 57' W.$

Tongarewa or Penrhyn Island, 50 feet high, nine miles long N.N.E. and S.S.W. (the chart makes it twelve miles long N.N.W. and S.S.E.), and about five miles wide, with an extensive lagoon, and a boat entrance into it. On the N.W. side a continuous village, with cocoanut groves throughout its extent. "Good anchorage in lagoon, one entrance on N.E. side near north extreme, and two for going out on S.W. side. Anchorage all over lagoon in 20 to 2 fathoms. Always found wind North of East, say E.N.E."—Captain Murray.

H.M.S. *Falcon*, 1867, "On the N.E. side, near the northern extreme, is a clear opening into the lagoon, in which the least water found was two fathoms." Pearl shell and beche-de-mer abound.

Wilkes makes the N.N.W. point in lat. $8^{\circ} 55\frac{1}{4}' S.$, long $158^{\circ} 7' W.$, South end, lat. $9^{\circ} 6\frac{1}{2}' S.$, long. $158^{\circ} 2' W.$

Jarvis Island, a small coral island, triangular in shape, $1\frac{3}{4}$ miles East and West, and a mile North and South, 10 or 12 feet above the sea, without a tree or shrub, and very dangerous. Lat. $0^{\circ} 22' S.$, long. $159^{\circ} 54' W.$ It has been occupied by the Phoenix Guano Company, who placed men on it for the purpose of working the guano beds.

THE TOKOLAU, OR UNION GROUP,

consists of three clusters of islets. The islets of each cluster are connected by a reef.

Fakaafo, or Bowditch Island, is of triangular shape, with the apex South. From North to South it is eight miles long, and in width from its West point four miles. On its S.W. and North points it is of considerable elevation. On the East side there are extensive groves of cocoanut trees. There is no entrance for a vessel to the lagoon, which appears to have but little depth. North extreme, lat. $9^{\circ} 20' S.$, long. $171^{\circ} 4' W.$ *

Nukunono is seven miles north and south, and five miles east and west, of triangular form, with the apex north. It has a lagoon with islets in it; the north-west side is a bare reef awash, and breaks heavily. Cocoanut and other trees on it. Lat. $9^{\circ} 5' S.$, long. $171^{\circ} 38' W.$

Atafu is a lagoon island three miles east and west, and $2\frac{1}{2}$ miles north and south. There is no passage into the lagoon; the sea breaks heavily on the reef. The islets are 8 or 10 feet above the water, and covered with cocoanut and other trees.

"No anchorage at this group; lie off and on while taking in cargo. Fair trade in copra."—Capt. Murray.

ELLICE'S GROUP

Extends south-east by south and north-west by north 360 miles, and consists of nine clusters of islands, between $5\frac{1}{2}^{\circ}$ and $11^{\circ} S.$, and 176° and $180^{\circ} E.$

H.M.S. *Basilisk* remarks — "When hove-to off the Ellice Group, there was always so strong an equatorial current to the west, that it was with difficulty the ship could be kept near the land. With the exception of *Speiden* or *Lynn Island* we found the position of the Ellice and *Mitchell Islands* tolerably correct. They are all low and flat, the tops of the cocoanut trees being 60 to 80 feet above the water."

Sophia Island, is described as a small wooded island, 2 to 3 miles in circuit; seen 18 to 20 miles off. A bank is reported 4 miles north-east of it, with from 15 to 12 fathoms, or less. H.M.S. *Rosario* made *Sophia Island* in $10^{\circ} 46' S.$, $179^{\circ} 31' E.$

MEEK SHOAL, a coral reef seen by Mr. J. Meek, to the West of the

* *Stuart Reef*, said to be 15 miles long, E. by S. and W. by N., and three miles broad; a small part above water; $8^{\circ} 55' S.$, $170^{\circ} 15' W.$ Its existence in the position assigned was disproved by the U.S.S. *Narragansett* in 1872. She passed completely across the bank, and found no bottom at 100 fathoms.

last position. No breakers. $10^{\circ} 40' S.$, $179^{\circ} 8' E.$ These require re-examination.

Nukulaelae, or Mitchell Group, "a cluster of eleven or twelve islets, situated on a coral reef which surrounds a shoal lagoon, extending five miles North and South, and two miles East and West. The landing for boats is hazardous. There is no passage into the lagoon, but a precarious anchorage may be obtained off the reef, on the lee side, in fine weather."—H.M.S. Basilisk. The trade here is said to be in the hands of the Germans.

POSITION.—South Point, $9^{\circ} 18' S.$, $179^{\circ} 48' E.$

Funafuti, or Ellice's Group, an extensive ring of small islets, on a coral reef surrounding a lagoon, covered with cocoanut and other trees, can be seen 10 or 12 miles. The lagoon is 13 miles long N. by E. and S. by W., and $7\frac{1}{2}$ miles wide, and off its S.W. point, distant about a mile, is an islet five miles in length by two in width.—(Wilkes). "The lagoon is of great extent, and possesses working room for any number of ships. All dangers clearly discoverable in daylight, out of the glare of the sun. A small supply of brackish water."—H.M.S. Basilisk.

POSITION.—East extremity, $8^{\circ} 31\frac{1}{2}' S.$, $179^{\circ} 21\frac{1}{2}' E.$

Two channels into the lagoon on the S.W. side are not navigable for large vessels; there is a good ship channel on the North and one on the South side of the reef. The Rosario passed through the North channel into the lagoon, least water, five fathoms.

To enter by North channel, bring the extremes of the large island S.E. $\frac{1}{2}$ S. and E. $\frac{3}{4}$ S., when a vessel will be close off the entrance, which has on the West side a small sand cay with a few cocoanut trees, and a larger cay well wooded, like two islands at high water, on the East. The deepest water is one-third the breadth of channel from West islet. When through the channel a S.E. by E. course, altering occasionally to avoid four or five shoal patches, leads off the Mission Station, distant seven miles.

Between the 3rd and 4th islets off the S.W. point of the large island, is a good ship channel, having seven fathoms deepest water, near the 3rd inland or eastern shore. Between this passage and Mission Station is one shoal near the passage. Good anchorage in 11 fathoms, sand, with the Mission Houses S.E. by E. $\frac{1}{2}$ E., South point of large island S.S.W.

The group of small islands off the S.W. point lie N.W. and S.E. "One of the best lagoons in group, two good entrances for large vessels, with $4\frac{1}{2}$ fathoms in them. Can run in by the Southern and out by the Northern. A patch in middle of South entrance may be passed on either side. Anchorage off village towards S.E. end; the best for a stranger off a sandy bay S. of village, being patchy further North. Fine islands for cocoanuts."—Captain Ohlson.

Nukufetau, or Peyster's Group.—There is a good ship channel into the lagoon, one-third of a mile wide, least depth five fathoms. It leads to an anchorage in 17 to 20 fathoms, sandy bottom, where a vessel may lie well protected by the reef.

H.M.S. Basilisk describes "the group as consisting of eight or nine islets, situated on a reef of some nine miles in diameter. The village is on the West side, near the entrance to the lagoon. The tide in the ship channel was running out of the lagoon at the rate of from four to five knots." Not much trade. South point of atoll, $8^{\circ} 4' S.$, $178^{\circ} 28\frac{3}{4}' E.$

OAITAPU, or Tracey Island, is nearly round, about four miles across, with a salt-water lagoon in the centre. Cocoanuts are abundant and very productive; also a good supply of taro, and some bananas. The island is surrounded by a reef with no outlying danger; there is anchorage off the north-west extreme, but landing is bad, except in canoes; no supplies and no water.—H.M.S. Rosario, "Good island for trade, anchorage off village near south-west end.—Ohlson." South end in $7^{\circ} 32' S.$, $178^{\circ} 46' E.$

Nui, Netherland or Eleg Island in $7^{\circ} 13' S.$, $177^{\circ} 14' E.$ (Captain Ohlson makes it 8' east of this). H.M.S. Basilisk describes it as follows:—"The reef is crescent shaped; the islets, six or seven in number, on its circumference. The north-west and south-west horns are joined by a long connecting reef, through which there is no passage; the village on the south-west islet. Boats find a difficulty in landing." "Good island for

trade; anchorage unsafe and very close in, off a large stone, at village on west side."—Ohlson.

Nutou or Speiden Island is about $2\frac{1}{2}$ miles long by $1\frac{1}{2}$ broad, densely covered with cocoanut trees. A narrow shore reef extends round the island. A small quantity of brackish water. The village is on the west side; pigs and fowls are plentiful; lat. $6^{\circ} 8' S.$, long. $177^{\circ} 22' E.$

GRAND COCAL SHOAL.—According to H.M.S. Basilisk (1872)—“After a careful search for Grand Cocai Island, in clear favourable weather, passing over the position assigned, it could not be found. But at St. Augustine Island an English sailor, resident there, stated that as an island it did not exist; but there was an extensive shoal, three or four miles in circumference, between St. Augustine and Hudson Islands, with five to seven fathoms water, which breaks in heavy weather, and that he had frequently sailed over this shoal and seen the bottom.”

Nanomaga, or Hudson Island (probably the Grand Cocai of Maurelle) low, and encompassed by reefs, $1\frac{1}{2}$ miles long, north and south, and nearly a mile wide east and west, can be seen 8 or 10 miles off. The reefs extending from its north and south points, nearly half a mile break heavily, the mean of reported positions $6^{\circ} 12' S.$, $176^{\circ} 16\frac{1}{2}' E.$

Nanomea, Augustine, the northernmost of the Ellice group. “A coral reef of crescent form, with two islets on the north-west and south-east horns, a third small islet lies between them. Reefs, half a mile in extent, run off the south-east and north-west extremes. The village is on the eastern side of the south-east islet. Position of centre, $5^{\circ} 36\frac{1}{2}' S.$, $176^{\circ} 10' E.$ *

Paanopa, or Ocean Island, is high in the centre; has no harbours or anchorages, and is steep to all round, clear of hidden dangers. It is about 10 or 11 miles in circuit. Cocoanuts and fowls may be obtained. The island can be seen 25 miles. Position, by Captain Cheyne, $0^{\circ} 48' S.$, $169^{\circ} 49' E.$ M. Dutailis, $0^{\circ} 52' S.$, $168^{\circ} 24' E.$

MATTOETEE (Motu-iti?) or Kennedy's Island, is stated to be in $8^{\circ} 36' S.$, $167^{\circ} 5' E.$; position requires confirmation.†

Marex Reef or Island, another doubtful position, in $8^{\circ} 25' S.$, $165^{\circ} 32' E.$, announced in the “China Mail,” otherwise unsupported.

Pleasant Island, by Capt. Cheyne, is in $0^{\circ} 25' S.$ $167^{\circ} 5' E.$ It is 15 miles in circuit, low, and covered with cocoanut trees. Captain Simpson makes it in $0^{\circ} 35' S.$ A fringing reef projects about 200 yards all round the island. It has no harbour or anchorage, is steep to on all sides, and clear of hidden dangers. “Usual trade—Copra, fruit, pigs, yams. Natives friendly. Strong westerly current.”—Capt. Murray.

GILBERT ARCHIPELAGO.

Krusenstern separates them into three groups, the Kingsmill Islands, consisting of Bishop or Drummond Island and their subordinates; the Simpson Group, Woodle, Henderville, and Hopper; and the Scarborough Range, Marshall, Knoy, Matthew Islands, &c. These names seem appropriate, and have been for years acknowledged. The group consists of fifteen or sixteen islands. The highest land of the group is not more than 20 feet above the sea. Many of the islands of this group afford anchorage on their lee side on sand banks; in some of them the lee or western reef is wanting. The islands are fast wearing away by the action of the sea during westerly gales. Great numbers of fish are taken in weirs on the coral flats. Turtle are taken in the season on the beaches; and shell-fish, with the sea-slug or beche-de-mer, are obtained by diving. There is not much to induce general trading vessels to come here; they possess but little in the way of refreshment, and there is neither wood nor water in any quantity. They possess many good harbours,

* REPORTED ISLANDS WESTWARD OF ELLICE ISLANDS.—Jesus Island (?) was discovered by Mendana in the year 1565, placing it in lat. $6^{\circ} 45'$, and 160 Spanish leagues from the Baxas di Candelaria. Krusenstern places it, in the list of his doubtful positions, in lat. $6^{\circ} 45' S.$, long. $171^{\circ} 30' E.$

Namless Island (?) is another doubtful position, lat. $2^{\circ} 50' S.$, long. $170^{\circ} 18' E.$
† The position given in Admiralty chart was sailed over by Capt. McKay in 1875, and searched for for two days 30 miles on each side, without any indication of it.

a rare advantage in low coral islands. From October to April is the winter, especially distinguished by the frequency of rains. Variable winds from northward and westward prevail at this season, and the violent gales from south-west are typhoon like. These storms last three or four days, veering gradually round to the north. The leeward sides of the islands receive most damage. From May till September the weather is fine, with clear skies, and occasional showers; during this time the wind blows constantly from the eastward.

The following account begins with the southernmost of the archipelago, and proceeds northward.

Arurai, Arore or Hurd's Island, the southernmost of the group, is low and well wooded. It may be seen 10 miles. Its length is six or seven miles, its breadth 1 or $1\frac{1}{2}$ miles. It cannot be reached except on the west. The south point is terminated by a breaker which extends three cables' length. The sea breaks heavily on the shore to the east. At the north point of the island there is a bank of sand, with some rocks interspersed, on which there are but $3\frac{1}{2}$ fathoms. It is all the more dangerous because the sea does not always break on it. Its extent is about four miles, and its direction is determined by the angles comprised between N.N.E. and E.N.E., of which the north point is the summit. The west point of this island forms an extensive bay, where the whalers anchor. Fish, poultry, coconuts, &c., are easily procured. South point, $2^{\circ} 41' S.$, $177^{\circ} 1' E.$ "Six miles S.E. and N.W. Anchorage in two places off villages to leeward. Natives friendly; trade—cloth, &c.; copra. A reef runs a good two miles off N.W. end. Note.—Most of the Kingmills are subject to drought, and the yield of copra is uncertain."—Ohlson.

Nukunau, or Byron Island, a low flat island, the S.W. side, is estimated to be four leagues in length. The position is given as lat. $1^{\circ} 25'$, long. $176^{\circ} 40' E.$ "I make it to be 10 miles west of position on chart. Anchorage off lee side in several places in 10 fathoms. Natives troublesome. A little copra."—Ohlson.

Peru, or Francis Island.—The south point is in $1^{\circ} 20' S.$, (about $176^{\circ} 11' E.$ About 10 miles long, north-west and south-east. A little copra. The reef is near the land, except on the west side, when spit extends 2 to 3 miles to the westward; best anchorage to north-west of spit, in 10 fathoms.—Ohlson.

Onoatua, Onutu, or Clerk Island, is in $1^{\circ} 50' S.$, $175^{\circ} 39' E.$ "Little trade, but natives friendly. Pass eastward, round north-west end, and anchor $1\frac{1}{2}$ miles from it, in 10 fathoms, $1\frac{1}{2}$ cables off reef."—Ohlson.

Tamana, is in $2^{\circ} 35' S.$, $176^{\circ} 7' E.$ Very little trade.

Taputeouea or Bishop or Drummond Island.—The U.S. exploring ships Peacock and Flying Fish, April, 1841, here encountered the regular north-east trades. It is $1^{\circ} 20' S.$, $174^{\circ} 57' E.$ 30 miles long, north-west and south-east, and varies in width from half to three-quarters of a mile. Thinly covered with cocoaunt and pandanus trees. On its west side the reefs and sand-banks extend off some distance, gradually increasing from the north-west point to the south-east, where they are as much as $6\frac{1}{2}$ miles in width. This reef is interrupted in many places, and there is good anchorage off the town of Utiroa, towards the north-east end, near a small sand-bank, usually bare.

Taputucoa.—" (Natives treacherous.) No one should go to leeward of this island (or Nanouti) if avoidable; pass eastward, and round the north-west point, and anchor about 4 miles from it, in 10 to 4 fathoms. Very little trade."—Ohlson.

Captain Hudson found a bank, on which he anchored in 15 fathoms water, at a distance of four miles from the island. There is neither wood nor water to be obtained at this island, and no inducement to visit it, except to trade for coconuts.

Good whaling ground exists in the vicinity, and the American whalers are in the habit of cruising in this neighbourhood. Those who visit these people ought to keep a constant guard against treachery. All intercourse

with them should therefore be conducted with great caution, especially in ships weakly manned.

Nanouti, or Sydenham Island.—"Not safe to go inside lagoon. In settled weather anchorage off south-west side in 4 fathoms, opposite an islet with a store on it. Strangers leaving this anchorage should steer 12 miles west by south before attempting to haul to the northward on account of the reefs, which have no break on them; great caution is therefore necessary. The north-west horn of the reef can be crossed in not under 5 fathoms, some 5 miles off shore. Very little trade."—Ohlson. In $0^{\circ} 36' S.$, $174^{\circ} 24' E.$ Is of coral formation, and a mere ledge of land, with a lagoon, reef, and a bank on its lee or south-west side. It is 19 miles long, north-west and south-east, and its width including lagoon and reef, $8\frac{1}{2}$ miles. On the south-west and north-west portions is a coral bank, 1 to $1\frac{1}{2}$ miles beyond the reef, on which there are 10 fathoms water.

The island is partially covered with cocoanut, pandanus, and other trees; the islets of which it is formed are nearly continuous, connected by the usual reef.

Nanouki, or Henderville Island, in $0^{\circ} 11' N.$, $173^{\circ} 39' E.$, is $6\frac{1}{2}$ miles long, east and west, $5\frac{1}{2}$ miles wide at the east, diminishing to 2 miles at the west end. This island affords neither wood, water, nor refreshments.

Kuria, or Woodle Island, in $0^{\circ} 14' N.$, $173^{\circ} 27' E.$, is 5 miles north-west and south-east, and its greatest width, at its south-east end, $2\frac{1}{2}$ miles. The north-west position has two small lagoons, used as fishponds by the chiefs. A reef extends to the north-west nearly 3 miles. It has no outer reef, and may be approached very closely. It affords neither wood, water nor refreshments. "Kuria and Aranahu belong to Apamama. No trade for strangers."—Ohlson.

Apamama, or Hopper Island, in $0^{\circ} 27' N.$, $173^{\circ} 57' E.$, is five feet above the surface of the ocean, 10 miles long north-west and south-east, and five miles in width north and south. There is anchorage on the west side, in an opening between the reef and the north-west point of the island, which is about two miles wide. The soundings vary from two to five fathoms; across it, in some places, the bottom is broken coral, in others coral sand. The entrance to the lagoon although feasible, should not be attempted through this passage; but there is a good passage into it on the south-east side of the island, a mile wide. A small quantity of fresh water may be had by digging on the beaches; wood and refreshments not procurable for shipping.

"An entrance to lagoon on south-west side, with $4\frac{1}{2}$ fathoms, is narrow and intricate. A wider entrance at north-west end has only $3\frac{1}{2}$ fathoms. Anchorage all over lagoon in seven and eight fathoms. All the lagoons are more or less full of patches. This is the best island for copra."—Ohlson.

Maiana, or Hall Island.—The north-east and south-east parts are continuous land, whilst to the south-west and north-west it consists of a reef and a bank, in some places awash, with a sand-spit in its lagoon. The western sides of the islands are, therefore, very dangerous, and should be approached with caution, as the sea seldom breaks on them, and the discolouration of the water is not at all times to be observed. It affords neither refreshment, wood, nor water. It is nine miles in length, and south-east and north-west, in $0^{\circ} 57' N.$, $173^{\circ} 4' E.$ On its west side, on some of the banks, there is anchorage in 10 to 15 fathoms.

"No entrance to lagoon. Anchorage off north-west end in 10 fathoms. Strangers require to be very careful as numerous patches lie for miles off south-west side. Always pass eastward of island, and round north-west point. Water usually not clear. Natives generally fighting."—Ohlson.

Tarawa or Knoy Island is 20 miles long north-west and south-east, in $1^{\circ} 29' N.$, $173^{\circ} 5' E.$ The land is continuous and wooded, with the exception of four gaps, where the reef is bare. The south side is 12 miles long east and west. On this part, near the west end, are three hummocks (which appear like islands in the distance), and several small sand-banks, connected by the same reef. The island has its lagoon, but it has the appearance of an extensive bay. The reef on the west side being a sunken one, on which is found five fathoms,

Maraki, or Matthew Island, 2° 0' N., 173° 25' E., is a lagoon island without entrance. It is five miles long, N. by E. and S. by W., and 2½ miles wide at its base, of triangular shape.

Apaiang, or Charlotte Island, in 1° 52' N., 173° 2' E. Is a lagoon island, consisting of a string of coral islets, within a reef, which is six or seven feet above the water. The reef has a bluff front, much worn by the sea. Its length north-east and south-west is 16 miles; its average breadth five miles. The north-west and west side is a continuous reef, four or five feet above the water's edge, on which are many islets. About the centre of the reef, on the south-west side, is a ship's channel into the lagoon, half a mile wide. Near its entrance is a small islet, which stands alone, and is a good mark for the entrance. "Narrow entrance to lagoon on south-west side; one mile south-east of One-tree Islet. Anchorage good under lee of land to north-east. Three shoal patches opposite entrance. Luffing close round weather side of entrance, a north course (good) clears to the eastward. On no account go in on the ebb. There is also anchorage outside, close in to entrance."—OHLSON.

Makin or Pitt Island and Butaritari or Touching Island.—The largest is called by the natives Taritari (Bataritari—Touching Island), and the smallest Makin (Pitt Island). The southern part of Taritari is in 3° 8' N., 172° 48' E. This island is triangular, with its apex south, and its sides 14 miles in length. The south-east is a continuous grove of cocoanut and pandanus. On the two other sides is a reef, awash, excepting the north-west point, in which there is a small inlet. Makin is much smaller, being but six miles long; it varies in width from half a mile to a mile. Its northern point lies in 3° 21' N., 172° 57' E. The entrance into the lagoon has 4½ fathoms of water, and is one-third of a mile wide. (Bataritari or Pitt Island: "Fine passage into lagoon, with five fathoms on south-west side, one mile from south-west point. Best anchorage on south-east side of lagoon, opposite large house, in six fathoms. Lagoon patchy. Copra sold for cash."—OHLSON.)

"Tamona, north of line, does not exist."—OHLSON.

CURRENTS.—"Among the Kingsmill Group run strong to the westward from one up to four knots, and very strong between the islets. Between the Kingsmill and Marshall Groups it trends gradually more to the north, and then between 4° and 8° N. the counter current runs to the east. Ships should work to the east between these parallels.

WINDS.—"The south-east trade crosses the Line all the year through at the Kingsmills, but they are liable to heavy westerly squalls (and from all quarters) in the hurricane season—December, January, and February. In the Marshall's in the northern winter the north-east trades reach as far south as the north end of Kingsmills; in the northern summer the south-east trades have been steady as far north as I have been—i.e., to 8° N. All through the year the wind at the Kingsmills varies from E.S.E. to E.N.E., changing to N.E. as you go north. There is no calm belt, but between the two groups some very squally weather. In the northern winter the north-east trade is steady and fresh up to half a gale in the Marshalls. In their summer the south-east trades reaches them for five or six months, which is their fine-weather season for drying copra."—OHLSON.

MARSHALL ARCHIPELAGO.

This extensive collection of islands lies between 4° 45' N. to 12° 0' N., and is separated from the Gilbert Islands by a channel 50 leagues broad.

Two lines or chains of islands, lying nearly parallel to each other, and running north-west and south-east, are included under the name Marshall Islands. The more eastern is the Ratak, and the western is the Rakik. Each chain numbers fifteen low coraline islands, several of which are very small, without lagoons; but the greater number are fully formed atolls, some of them of immense size.

The **Ratak Chain**, the westernmost, contains fifteen islands in the following order from the south, viz. :—Mili, Maejuro, Ahrno, Aurh,

Maloelab, Urikub, Wotje, Likieb, Jemo, Ailuk, Mejit, Utirik, Taka, Bikar, and Taongi.

Mili, or Mulgrave Islands, appear to form a chain of atolls. Together they form a sort of quadrilateral figure, on the east side of which is a double belt of islands. These islands are almost all connected with each other at low water. In general the whole chain is very steep-to on the outside, and only increases on the side of the interior lagoon, where it is less disturbed by the sea, and where the coral banks are in course of formation.

The space enclosed by these islands is a real sea, navigable for every description of vessels. The bottom, generally at the depth of 22 to 27 fathoms, rises now and then nearer the surface, and shows in white patches, which thus indicate the dangers, and also point out the points where the anchor may be dropped. These banks, bestrewed with rocks, are nevertheless dangerous to anchors and moorings.

To take the best position attention ought to be paid to the tide, and it ought to be chosen, if possible, at low water. The passage for large ships is between Barr and Tokoeoa Islands, the first to the East, the other to the West of the entrance.

To reach the anchorage with winds from the eastern quarter, the only point for attention is to take up such a position as will allow you to range as near as possible to the pitch of the eastern reef, and rounding the bank attached to Barr Island as near as you please; it is shown by the whitish water; by this means you will avoid a small patch to the S.E., over which the flood runs $1\frac{1}{2}$ knots. This patch is, until half tide, indicated by very strong rippings, and is nearly awash at low water.

In general it is better to enter or leave with the tide, unless the breeze is fair, and sufficient to overcome the current.

MILL.—"Entrance to lagoon on north side, anchorage in lagoon on its west side in 10 fathoms; also along outside to leeward. Same trade as Jalutt."—Ohlson.

Bouguenieu is the first islet West of Tokoeoa.

Position of the anchorage, $6^{\circ} 14' N.$, $171^{\circ} 56' E.$

Captain Wilkes says they are in lat. $5^{\circ} 59' 15''$, long. $172^{\circ} 2' 33''$ (probably the S.E. part of the island), but his account will not coincide with that given above.

Majuro, or Arrowsmith Island.—The length, W.N.W. and E.S.E., is 18 miles, the breadth $1\frac{1}{2}$ miles. It is of the usual coral formation, with a lagoon. It is a magnificent island, with forests of bread-fruit and pandanus. Coconuts abound, and bananas seem to be plentiful.

"Over 20 miles E. and W., entrance to lagoon on north side, large opening, a four-fathom bank faces entrance. Anchorage in lagoon under islets on N.E. side, and in S.E. corner in from 14 to 3 fathoms, good. Same trade as Jalutt."—Ohlson.

The S.E. point is in $7^{\circ} 5' N.$, $171^{\circ} 24' E.$

Ahrno, or Daniel Island and Pedder Island, West of the foregoing. The broad and open channel separating them is Fordyce Passage. The N.E. point (of Daniel Island) is in $7^{\circ} 30' N.$, $171^{\circ} 52' E.$ The S.W. point (of Pedder Island) $7^{\circ} 11' N.$ and $171^{\circ} 40' E.$

"Principal entrance to lagoon in bay on N.E. side, to eastward of a remarkable high islet, $4\frac{1}{2}$ fathoms in channel, which breaks occasionally. Anchorage in lagoon in S.E. corner under small islet in seven or eight fathoms. Good anchorage outside off S.W. end. See chart. Same trade as Jalutt."—Ohlson.

Aurh, or Traversey Islands.—This group is 13 miles long N.W. and S.E., and six miles broad. On the surrounding reef are thirty-two islands, the N.W. of which is Pigen. Stobual Island, at the N.E. end, has a very pleasant aspect. The anchoring place is in $8^{\circ} 19' N.$, $171^{\circ} 12' E.$ Aurh is at the S.E. end of the atoll.

"Entrance to lagoon (which is very clear of patches) at S.W. end, have to work in, good anchorage. Station in S.E. corner." (See Elmore Islands).—Murray.

Maloelab (Kaven), Calvert, or Araktcheeff Islands.—This group is 30 miles long N.W. and S.E., and $11\frac{1}{2}$ miles broad. The whole cluster consists

af sixty-four islands. Kaven or Arakteheef, to the N.W., the largest, is $2\frac{1}{2}$ miles long, and three-quarters of a mile broad, in $8^{\circ} 54' N.$, $170^{\circ} 49' E.$ The S.E. island is in $8^{\circ} 29' N.$, $171^{\circ} 11' E.$ H. W., F. & C., 1h. 52m.; rise, 4 feet. Good water in pits on some of the islands, provisions not abundant.

Tjan has only the cocconut, pandanus, and bread-fruit trees. The anchorage off this island is in $8^{\circ} 53' N.$, $171^{\circ} 1' E.$ Torua, which is twice as large as Tjan, is in $8^{\circ} 43' N.$, $171^{\circ} 9' E.$ Thence the atoll trends southward, and finally further south-eastward (the islands being generally small) to Airik (about the same size as Torua). There is excellent anchorage in eight fathoms water, about 60 fathoms from the island, in $8^{\circ} 31' N.$, $171^{\circ} 10\frac{1}{2}' E.$; rise of tide, four feet. The S.E. island is in $8^{\circ} 29' N.$, $171^{\circ} 11' E.$ Olot, off which there is anchorage is eight fathoms, coral sand, is in $8^{\circ} 46' N.$, $171^{\circ} 10' E.$

Erikub, or Bishop Junction Islands.—Erikub lies southward of Wotje, and is considerably smaller. Its length is 24 miles, and breadth 4 miles. The whole circle consists of one reef, and contains but very few islands. The south point of it is an island, probably named Egerup. There appears but little inducement for visiting the group. The south point is in $9^{\circ} 6' N.$, $170^{\circ} 4' E.$

Wotje, or Romanzoff Islands, lies north of the preceding. The latter names are applied by Kotzebue, but the remarks relating to their earlier discovery also belong to those of the Erikub Group, as above stated. This group is of an irregular oval form, 28 miles long W.S.W. and E.N.E., by 10 miles in breadth. It consists of the usual encircling reef, on which are distributed 65 islands, of various magnitude. Wotje, or Otdia, is the easternmost and largest, about two miles long. The anchoring place inside the island, Christmas Harbour (or Port Noel), is in $9^{\circ} 28' N.$, $170^{\circ} 16' W.$ H.W. F. & C. 2h. 30m.; range 7 feet. South of it is Egmedio, near the south-east angle of the reef; to the south of it is a small high island.

The reef is quite continuous to the north-west of Otdia, and on it stands a connected chain of small islands, reaching as far as Ormed Island, at the north part of the reef, eight miles from Otdia. The anchorage in this is in $9^{\circ} 33' N.$, $170^{\circ} 11' E.$ From Ormed, the north side of the reef, also quite continuous, runs W.S.W. eight miles to Bird Island, and nine miles still further to Goat Island, from whence to the west end of the reef is five miles. There are several channels through the reef, all on the lee side. The first is $1\frac{1}{2}$ miles south-east of the west point, narrow and impracticable; the next is Rurick Strait, five miles further round the reef; hence the reef continues, without islands, nearly 20 miles, to Schischmareff Strait, in every way preferable to Rurick Strait, as a ship can beat in or out with the usual trade wind. East of this again is Lagediak Strait, four miles from the south-east point of the group.

Likieb, or Count Heiden Islands.—The centre of the group is in lat. $9^{\circ} 51' N.$, long. $169^{\circ} 13' E.$ On the north-west of the group are several large islands, well covered with cocconut trees. There are two broad entrances to the inland sea, which were accurately examined, and found to be perfectly safe for a ship-of-the-line, since you may sail in or out with the trade wind. From this cause, and the appearance of excellent anchorage, Kotzebue recommends this group to any navigator wishing to put into Radak. The north-west point of the group is in $10^{\circ} 4' N.$, $169^{\circ} 2' E.$

Jemo, or Steep-to Island, a small island, is in $9^{\circ} 58' N.$, $169^{\circ} 45' E.$, 20 miles E.N.E. $\frac{1}{2}$ E. from the Likieb Islands.

Mejit, or New Year Island, is a low, woody island, three miles long north and south, and three-quarters of a mile broad. From the north side a very long reef extends. $10^{\circ} 8' N.$, $170^{\circ} 55' E.$

Ailuk or Tindall and Watts, or Krusentern Islands.—The group is 15 miles long and 5 miles broad. The eastern side a chain of islands, but the western is a coral reef. Ailuk or Ailu is in the south part. It is small, scarcely a mile long. Capeniur Island is the northernmost of the group. Kotzebue's anchorage was in $10^{\circ} 17' N.$, $170^{\circ} 0' E.$ H. W., F. & C., 4h. 53m.; rise 8 feet.

Utirik or Kutusoff, or Button Islands.—This group and the

next taken together extend in north and south direction, for $25\frac{1}{2}$ miles. Kutsuff, or Utirik, is the only one inhabited.

According to Kotzebue, the north point of the reef is in $11^{\circ} 29' N.$, $169^{\circ} 54' E.$ Captain Moore makes the centre in $11^{\circ} 20' N.$, $169^{\circ} 50' E.$

Taka, or Souwroff, like the former group, consists of small islands, connected by coral reefs. Uninhabited. The channel separating the two groups is $3\frac{1}{2}$ miles in length, free from rocks, and of unfathomable depth. The channel is in $11^{\circ} 11' N.$, $169^{\circ} 51' E.$

Bikar, or Dawson Island, is northernmost of the islands hitherto considered as belonging to the Ratak chain. Bigar, from the statement of a native to Kotzebue, forms a circle, consisting, for the most part, of reefs, and contains only two small islands; a third is laid in the middle of the basin. The centre is in $11^{\circ} 48' N.$, $170^{\circ} 7' E.$ Uninhabited.

The **Ralik Chain** runs parallel to the Ratak chain just described, and extends to the same parallel of latitude. The fifteen islands or groups which compose this chain, commencing from the north, are—Bikini, Kongelab, Rongerik, Ailinginae, Wottho (or Kabahala), Ujae, Kwajalein, Namu, Lib, Jabwat, Ailinglabelab, Jaluit, Namerik, and Ebon.

Kongelab, or Pescadore Islands, according to Kotzebue, is a group of low, thickly-wooded, coral islands, forming, as usual, a circle round a basin. The greatest length, east and west, is 10 miles. The centre of the group in $11^{\circ} 19' N.$, $167^{\circ} 25' E.$

Captain Hudson says it is of triangular shape, with, on its reef, several islets and some sand-spits, and affords nothing but the pearl-oyster and turtles in the season. There are two entrances into the lagoon; one about the middle of the north, the other on the east side. No inhabitants.

Rongerik, or Rimski-Korsakoff Islands.—It is, according to Kotzebue, 54 miles in extent, E.N.E. and W.S.W.; but now known to consist of two separate groups; its east point in $11^{\circ} 27' N.$, $167^{\circ} 14' E.$

The larger island is about 26 miles long, north-east and south-west. An entrance to its lagoon on the south side.

Ailinginae, the smaller and south-western of the Rimski-Korsakoff Isles, is 14 miles long by 9 miles wide. Uninhabited. Its south-west point is in $11^{\circ} 8' N.$, $166^{\circ} 26' E.$

Bikini, or Eschscholtz Islands, is the westernmost of these groups. Kotzebue saw only the western part of the group, which he places in $11^{\circ} 40' N.$, $166^{\circ} 24' E.$ Captain Chramtschenko also saw only its western portion. "At noon we were close in shore, in $11^{\circ} 33' N.$ $165^{\circ} 37' E.$ (discrepancy in longitude). Could see twelve islands east and west. We being about the centre, stood for a channel three miles in width between two islands; getting near we could see the bottom stretching across; sent a boat to sound, found 11 fathoms, and sailed over. After passing this bar found ourselves in smooth water. Soon after saw land in the north-west and north-east, also a shoal with 10 fathoms over it. I was now convinced we had entered a spacious lagoon. I counted from aloft 14 islands, and the lagoon must be 20 miles across at least. We tacked and stood out, and cleared the western extremity at sunset, which is a circular reef. This part is very dangerous, as the adjoining islets are small and very low. The bars between the islands and shoals inside are more sunken than any we have seen heretofore."

Wottho or Shanz Islands, a group of thirteen islands, discovered by Captain Closly, near this longitude, but 30 miles southward, prevents them being considered as the same. The Shanz Islands extend four leagues from north-west to south-east, and are five miles broad. Their centre is in $10^{\circ} 5' N.$, $166^{\circ} 4' E.$

Another announcement near this, Kabahala Island, from whaler report in $10^{\circ} 5' N.$, $166^{\circ} 45' E.$, is most likely the same as Shanz Island.

Kwajalein, or Catharine Islands.—Three groups of islands. The northernmost are placed in $9^{\circ} 14' N.$, $167^{\circ} 2' E.$

Ujae, or Lydia Islands, the centre of the three groups above mentioned, lie in $9^{\circ} 4' N.$, $165^{\circ} 58' E.$

The Serpent Group, in $9^{\circ} 14' N.$, $166^{\circ} 2' E.$, are apparently the same as

Lydia Island, but there is much confusion in the hydrography of these groups.

Lae, or **Brown Islands**, a group of fourteen islands, encircling three sides of a lagoon four miles across, the western part protected by a reef with a small channel in $9^{\circ} 0' N.$, $166^{\circ} 26' E.$

Namo, **Margaretta**, or **Paterson Island**, the southernmost of the three groups above. There can be no doubt of the identity of the **Margaretta Island** of the ship *Ocean*, in 1804, and the **Paterson Islands** of the brig *Elizabeth*, in 1809. This island or group of islands, had a fertile appearance, being one continuous chain of cocoanut trees. It lies **W.N.W.** and **E.S.E.**, low, and well wooded; south extreme, $8^{\circ} 56' N.$, $167^{\circ} 42' E.$ (It may be **Dove Island**).

Jabwat, or **Princessa Island**, is variously described as a small island from $1\frac{1}{2}$ to 6 miles in circuit, in $8^{\circ} 20' N.$, and from $167^{\circ} 30'$ to $167^{\circ} 36' E.$, surrounded by a reef one mile from the shore.

Lib may be a portion of one of the groups next described. It is placed in $8^{\circ} 15' N.$, $167^{\circ} 28' E.$

Ailinglabelab, or **Mosquillo Islands**, are very low and dangerous, and a ship in thick weather might run on the reef without seeing the land. According to Captain **Chramtschenko**, the group is composed of two portions joined by a narrow isthmus which lies in $8^{\circ} 0' N.$, $168^{\circ} 13' E.$, the northernmost island (**Lib**), $8^{\circ} 10'$, $168^{\circ} 0'$; the southernmost, $7^{\circ} 46'$, $168^{\circ} 23'$, giving an extent of 30 miles **N.W.** and **S.E.** Their breadth is $11\frac{1}{2}$ miles.

Helut, or **Elmore Islands**, consists of a large island and nearly twenty smaller ones, connected by reefs extending 20 miles **N.N.W.** and **S.S.E.**, and $12\frac{1}{2}$ miles in breadth. The southernmost is in $7^{\circ} 15' N.$, $168^{\circ} 46' E.$

"The **Marshall Islands**, north of **Elmore** and **Aur**, are (? partly) uninhabited, produce very little, and are visited by the natives twice a year to be stripped.

"**Elmore**.—Good entrance to the lagoon to the northward, have to work in, anchorage all over it. Station in south-east corner; little trade."—Capt. **Murray**.

Jaluit, or **Bonham Islands**.—From the south-east point of the island a very dangerous, low, sandy point, with scarcely a tree or bush on it, extends to the eastward and northward, 2 or 3 miles, with a very heavy surf breaking on it. According to Captain **Chramtschenko**, the group is 30 miles long, north-west and south-east, and 20 miles broad; composed of four large islands, nineteen smaller, and one in the centre of the group, separated from the others. There are three entrances to the group, one to the north, another to the west, and the third to the south-east. According to Captain **Brown** the group is full 40 miles north and south. Its south point in $6^{\circ} N.$, $169^{\circ} 36' E.$ In width, about 8 miles, and form irregular. "Good anchorage in lagoon in 10 fathoms; entrance at south-east end. Trade, provisions, and clothing. Export, copra; in hands of Germans, who have coal here for men of war."—Captain **Ohlson**.

Kili, or **Hunter Island**, is stated to be 2 miles in extent from north-west to south-east. The position assigned was $5^{\circ} 46' N.$, $169^{\circ} 0' E.$ Uninhabited.

Namarik, or **Baring Islands**.—They are two in number, both very low, and covered with trees, amongst which the cocoanut was very conspicuous. They appeared circular, and of no great extent, seemingly joined by a reef. The position was only inferred as lat. $5^{\circ} 35' N.$, long. $168^{\circ} 13' E.$ "13 miles westward off where laid down in my chart; the position of the other islands agreeing with chronometer. No anchorage. Same trade."—**Ohlson**.

Ebon, **Boston** or **Covell Islands** consist of thirteen low coral islands, covered with cocoanut trees, and connected by coral reefs forming a large lagoon inside. The group, 30 miles in circuit, has a good ship passage leading through the reef to the lagoon on the west side. It is stated to be a thickly populated and very narrow strip, stretching quite 8 miles along the entire south-west, south, and south-east border of the atoll, lat. $4^{\circ} 35' N.$,

Lat 6-1 N
169 44

anchorage
5 to 12 fathoms

long. 168° 47' E. "Narrow entrance to lagoon on west side. Anchorage inside good. Go in with the tide. In fine weather anchorage outside close in. Pilots to be had at Jalutt, Mili, and Ebon."—OHLSON.

Eniwetok, or Brown Group.—Parry's Island, the southernmost, is the eastern boundary of a most dangerous and extensive line of keys or shoals, which occupy more than half a degree of longitude, without a single apparent passage. On the reef are thirty low islands and reefs, enclosing a lagoon. It is a circular atoll, 20 miles in diameter from north to south, and 26 miles from east to west. Arthur (north) Island is in 11° 40' N., 162° 15' E., the west extreme of the atoll in 11° 30' N., 161° 58' E., and Parry Island to the south-east in 11° 21' N., 162° 25' E.

Ujilong, or Providence Island, extends E. by S. and W. by N. 12 miles by 5 miles broad. There are ten islands on the reef, the largest one on the east end. Two passages lead into the lagoon on the south shore; the best is five miles from the east point. There are several islets in the lagoon. The reef on the north side runs out three or four miles beyond the islets. The mean position of the centre of the atoll may be taken as 9° 39' N., 161° 8' E.

In conclusion we may again refer to the unsatisfactory state of the hydrography of the Marshall Islands, and especially of the Ralik chain. Until a more complete examination is made, their nomenclature must remain in a confused condition; for example, the following island, whose description is given by Captain Ohlson, is not named here, but may be recognised by those who have traded there.

TARAUM.—"Entrance to lagoon in 4½ fathoms, three miles from west point, bring a small sand island with a tree on it to bear E. by S. A reef on west side of lagoon under water seldom breaks. Make short tacks on each side of the bearing till well inside the reef. There are several 3½-fathom patches in entrance. Anchorage all over lagoon in 10 to 5 fathoms. It is full of patches. Do not attempt to work in with sun anywhere near ahead. Temporary anchorage outside round south-west part, and along south-west side."—OHLSON.

THE CAROLINE ARCHIPELAGO.

Only a few of the islands of this extensive group visited by our traders can at this time be given.

The predominating winds are the north-east trades. During the northern winter Ponapi is fully exposed to their action. This period usually lasts from December to May, inclusive.

CURRENTS.—When the north-east trade is freshest, strong westerly currents are generally experienced. From the middle of August to the middle of November, when strong westerly winds with heavy squalls may be expected, strong easterly currents prevail.

GALES. The severer class of gales are comparatively unknown here. The typhoons of the China Sea, and even of the seas north of the Marianas, about the Bonin Islands, rarely (if ever) extend to this island.

The description of the archipelago begins with the easternmost, and proceeds in a westerly direction.

Kusaie (Ualan), or Strong Island, 24 miles in circuit, is the easternmost and one of the lofty basaltic peaks of the Caroline Islands. On this northern portion is Mount Buache, 1,914 feet high. On the southern portion is Mount Crozer, 2,152 feet high. The north part of the island is surrounded by a reef, which opens before the break between the mountains. The southern part is surrounded by a chain of coral islets, connected by reefs, forming on the side towards the island a shallow lagoon. The chain is broken towards the southern part of the island, forming the small port Lottin.

PORT LELE, or PANE BAY, the most spacious, is on the eastern side of the island; as the prevalent winds are from the eastern quarter it is not easy to leave it, the more so as there is no sounding in the entrance.

Coquille Harbour is on the western side of the island, which gives it a great advantage over Port Lelé. The sea is smooth as a mill-pond. Good

holding ground, on a bottom of black mud, near two small islets in the bottom of the harbour. This Island will serve as an excellent place for refreshment, particularly for whalers or vessels proceeding to China by the eastern route. A good supply of yams, abundance of fresh water and fruits can be had here. The north-east islet in Coquille harbour is in $5^{\circ} 21' N.$, $163^{\circ} 1' E.$

OULAN, or STRONG ISLAND.—“Has two harbours on north-east side, but open to the trade, and exposed to the swell. Land wind occasionally in the morning. Good island for trade.”—Murray.

MACKAW REEF, awash in $3^{\circ} 20' N.$, $160^{\circ} 18' E.$, a quarter of a mile in extent north-east and south-west. From the mast-head broken patches were seen to the eastward; another patch of breakers was seen to the south-westward.

Pingelap, Musgrave, or MacAskill Islands.—Captain MacAskill discovered two islands covered with trees, extending about three leagues south-east and north-west. The centre in $6^{\circ} 12' N.$, $160^{\circ} 53' E.$

The two islands called Takay and Pingelap are covered with cocoanut trees, and connected by coral reefs, forming a lagoon, with a good ship passage through the reef on the west side into it. The group is about 15 miles in circuit. The reefs produce beche-de-mer, but not in any quantity.

MACASKILL ISLAND.—“No anchorage; very little current. Good island for trade.”—Murray.

Mokil, Duperrey, or Wellington Islands, a group of three coral islands, very close to each other, named Aoura, Ongai and Mougoul. The north-east point of Aoura is in $6^{\circ} 42' N.$, $159^{\circ} 50' E.$ They occupy an extent of less than 10 miles north and south. They are covered with cocoanut trees, and connected by coral reefs, forming a lagoon, with a passage on the north-west side. The reefs produce beche-de-mer. Pigs, fowls, turtle, and tara were procured. The only water was river water.

“No anchorage; trade copra.”—Murray.

Ponapi, Ascension, or the Seniavine Islands, consist of three separate groups, one of which contains the largest and highest island of the Carolines. They lie between $6^{\circ} 43'$ and $7^{\circ} 6' N.$, 158° and $158\frac{1}{2}^{\circ} E.$ They are surrounded by a reef, $18\frac{1}{2}$ miles from north to south, 17 miles from east to west, and about 60 miles in circumference. The large island of Ponapi or Ascension gives its name to the group, occupies the centre, and is 12 miles from north to south, and $14\frac{1}{2}$ miles from east to west, occupying nearly the whole of the area enclosed by the fringing reef. A dozen islets and rocks surround the island, and on the coral reef are from fifteen to twenty coral islands, resembling the ordinary atolls. Its highest point, Mount Monte-Santo, is 2,858 feet above the sea. On its north-west portion is a spot about 1,000 feet high, entirely flat, from which the land rapidly falls towards the north-west point of the island, Cape Zavalichine. In other directions the land slopes gradually from the summit to the shore. On the south side is an isolated and distinct mass, which, seen from East to West, resembles a lighthouse or a sentry-box.

“Surrounding the whole body is a reef at an average distance of two miles. There are no less than seven considerable intervals in the continuity of this reef, forming as many harbours, several of which are really excellent. Between the reef and the shore are all the usual coral patches.”—Dr. Gulick.

“Two good harbours—one, large, to the north-west, one, small, to the south-west, no difficulty in going in. This is a depôt island for collecting copra.”—Murray.

Kiti, or Rono Kiti Harbour.—A vessel bound to this harbour from the eastward, from December till April, should get into the latitude of the island as soon as possible after passing Duperrey Isles, and run to the westward on this until the island is sighted; as strong westerly currents prevail during these months, with much hazy weather, and she would be liable to get set past the island, if a proper allowance were not made for the current. By the time the reef is visible from the deck—if the weather be moderate—it is presumed a pilot will be alongside.

The harbour forms a snug basin, where a ship can lie as safe as in a dock. The entrance, however, is very narrow and intricate; the narrows,

for about 200 yards being only 40 fathoms wide. The outer entrance is between two small woody islands, Nalap and Namaur, a sandy islet with bushes on it, situated on the reef, to the eastward of the former. The channel is four cables wide, between Shaulak or little Nalap and the sandy islet. The largest, Nalap, is $2\frac{1}{2}$ cables long, north and south, and the inner one two-thirds of a cable in extent. The sandy islet, on the starboard hand going in, is three-quarters of a cable in length. The distance from the entrance to the narrows is nearly a mile north and south (true) mid-channel. In entering, the elbow of the barrier reef southward of the sandy islet, should have a berth of $1\frac{1}{2}$ cables, as a spit extends from it some distance. In the middle of the outer bight or harbour, the depth is 45 fathoms, decreasing gradually towards the narrows, where it ranges from 10 to 15 fathoms. A detached sunken rock, with only four feet on it, in the outer entrance of the narrows, must be left on the port hand going in. The course through the narrows is N.W. $\frac{1}{2}$ W. (true). When inside, the water deepens to 20 and 25 fathoms, and then gradually shoals to the anchorage at the head of the basin. The harbour or basin is seven cables in length, north by east and south by west (true); and between the narrowest part of the reefs which form it, $1\frac{1}{2}$ cables in width. The best anchorage is at its head, in seven or eight fathoms good holding ground, where the port has a diameter of two cables each way, without going under five fathoms. The reefs which form this harbour dry at low water springs on each side, and at the head of the basin.

Kiti, or Roan Kiddi River is a quarter of a mile from the anchorage, whence good fresh water can always be procured; abundance of firewood can be obtained on the low land at its mouth. H.W. F. & C., 4h. (or ? 6h.); rise, $5\frac{1}{2}$ feet. A stranger before attempting to enter will require to place buoys on the rocks and east side of the channel.

With a careful mast-head look-out all danger can be seen and avoided in a clear day. The best time to enter this harbour is on the first of the flood; $6^{\circ} 48' N.$, $168^{\circ} 26' E.$

Another port on the north side of the island, off the north-west point of the island (remarkable for the high basaltic rock), has a passage $2\frac{1}{2}$ cables length in width, and 25 fathoms in depth, and within, to all appearance, an extensive and safe harbour.

LOD HARBOUR, another small harbour—much used by whalers, on account of being able to sail in and out with the prevailing north-east wind—is on the east side of the island. The entrance is through a break in the reef, and the anchorage between that and the mangroves which front the shore.

METALANIEN HARBOUR, on the north-east side of the island, is perfectly safe, and sheltered from all winds. It has a wide entrance on the north side of the island of Naa, and the only hidden danger to be avoided when running in is a sunken rock, some distance within the entrance, which lies nearly in mid-channel. It sometimes breaks; but it can always be avoided by keeping the starboard side of the channel close aboard. The barrier reef at this place extends a long distance from the main land. The harbour is formed by the main land, and resembles a horse-shoe. The channel through the reefs which leads to it runs south-west and north-east nearly in a direct line from the entrance in the barrier reef to the heads of the harbour. It may be known by a remarkable peaked hill, resembling a spire or sugar-loaf, situated on the north shore within the harbour. Abundance of firewood and excellent fresh water can always be obtained. Strong north-east winds prevail from December to April, with much hazy weather and frequent squalls, attended with rain. Strong westerly currents are then very frequent. From March to August the winds are generally light and variable, chiefly from the eastward, with fine weather. In September, October, and November, strong westerly winds, with severe squalls and rain, may be expected, with frequent strong easterly currents.

H.M.S. Larne remarks on this harbour:—"It is highly advisable that no square-rigged vessels of any magnitude should enter this harbour. The passage is narrow, with two rocks in it at different angles. As it fronts directly to the north-east, whence the trade-wind is perpetually blowing, a heavy swell rolls in incessantly, and there being no soundings without the

reef, it is dangerous in beating out in case of the wind dropping. Boats are useless for towing on account of the heavy swell."

THE ANT or ANDEMA GROUP, the second cluster attached to the Ponapi islands, lie to the south-west of Ponapi, their nearest points are seven miles apart. The group is composed of a dozen coral islands of different sizes. The reef is of triangular form, about eight miles long on either side, the islands occupying that facing the south-east. The south extreme is in $6^{\circ} 43' N.$, $158^{\circ} 5' E.$ They are resorted to from May till September for the hawks-bill turtle fishery, and at other times for coconuts and bread-fruit.

THE PAKIN or PEGUENEMA GROUP, the third and westernmost of the Senuavine Islands, is composed of five small islands, extending five miles north-west and south-east. The south-east island is Katelina, its east point is in $7^{\circ} 2' N.$, $158^{\circ} 0' E.$ The next, $1\frac{1}{4}$ miles northward of it, is called Ta; the next, Tagaik. Kapenoar or Kapenuare is the westernmost and largest island.

Poultry are also plentiful in this group.

Ngatik (Ngaryk), or Valientes Islands, a small group of eight coral islands, the east extreme of which is in $5^{\circ} 47' N.$, $157^{\circ} 32' E.$, is of triangular form, 22 miles in circuit, with a continuous reef surrounding the whole of the group. No passage into the lagoon. The south side of the northernmost island is covered with coconut trees.

Nukuor (Nouguore), or Monteverde Islands.—This group lies considerably to the south of the general line of the Caroline Archipelago, the centre in $3^{\circ} 52' N.$, $154^{\circ} 56' E.$ They are small, low, coral islands, covered with coconut and other trees, connected by a reef, forming a lagoon inside; and are 12 or 14 miles in circumference.

Greenwich, or Constantin Island.—Captain Symington says: It is of the usual form of a coral lagoon, consisting of 26 small islets, a few feet above water, covered with coconut trees. Reefs extend in a W.N.W. direction from the extreme north-west islet to a distance of five miles. From a mean of the positions stated it may be placed in $1^{\circ} 3' N.$, $154^{\circ} 51' E.$

DECAPOLIS REEF, in $0^{\circ} 32' N.$, about $152^{\circ} 51' E.$, seemed to be of small extent. The sea, although smooth at the time, broke occasionally over it.*

Between $5^{\circ} 17'$ and $5^{\circ} 37' N.$, $153^{\circ} 59'$ and $153^{\circ} 37' E.$, are three low coral groups, on which may be reckoned ninety islets of various dimensions.

Lukunor, the easternmost of these groups, is of an oval form, and 18 miles in circuit. Lukunor Island, at the eastern angle, is in the form of a horseshoe, and forms an excellent port, Chamisso. The breadth of the island is from one-third of a mile to 150 paces. Its middle, seven feet above the water level, is covered with bread-fruit trees, and on the shores coconut and other trees. Port Chamisso is in $5^{\circ} 29' N.$, $153^{\circ} 58' E.$

The Sotoan Group, south-west of Lukunor, 17 miles in length from north-west to south-east, and 12 miles broad. About sixty islets were counted on it. Captain Cheyne found a good passage through the reef, on the south-west part of the group, and anchorage in 25 fathoms in the lagoon, near the entrance, but the bottom was very uneven and rocky. North-west extreme in $5^{\circ} 27' N.$, $153^{\circ} 27' E.$; south extreme, $5^{\circ} 16' N.$, $153^{\circ} 40' E.$

The Etal Group, the third and northernmost of the Mortlock Isles, is a small group, not more than 12 miles in circuit, composed of several low islands and islets, thickly wooded, connected by a reef, forming a lagoon inside. The channel between it and Sotoan is 5 miles wide, and clear of danger. The centre is in $5^{\circ} 38' N.$, $153^{\circ} 24' E.$

The Namoluk Islands, 35 miles to the north-west of Lukunor, are five in number, the group 15 miles in circuit, of a circular form, 100 feet high (to the top of the trees?), and well wooded with coconut, bread-fruit, and other trees. The reef appeared to have no hidden dangers. The north-west isle is in $5^{\circ} 55' N.$, $153^{\circ} 13' E.$

IRONS SHOAL (chart, Lady Elgin).—A coral shoal was sailed over by Captain Irons, of the Lady Elgin. Ten fathoms was found in $6^{\circ} 18' N.$,

* A Reef marked (?) is placed on Imray's chart in $2^{\circ} 20' N.$, $153^{\circ} 50' E.$; and a bank, with 13 fathoms, in $4^{\circ} 13' N.$, $150^{\circ} 5' E.$

149° 28' E., whence $7\frac{1}{2}$ fathoms was carried for about $1\frac{1}{2}$ miles to S.S.W., and then to N.N.W., when broken water was seen to north and clear water to west. It may be the same as La Paz Bank, which is placed 25 miles to the northward.

IANTHE OR NILE SHOAL.—Two shoals have been announced as existing at 80 and 102 miles respectively from Ifalik or Wilson Island, in a S. by E. direction—the first, Ianthe, in $5^{\circ} 53' N.$, $145^{\circ} 39' E.$; the second, Nile, in $5^{\circ} 31' N.$, $145^{\circ} 42' E.$, nearly on the same meridian, but 22 miles apart. The Ianthe passed within one or two ship's lengths of the eastern and shoalest part of a ridge of sharp rocks (apparently not more than 8 or 10 feet under water, the water of a milky whiteness) in soundings of probably 6 or 8 fathoms. The shoal appeared to extend S. by E. and N. by W. about half a mile. The Ianthe obtained on the same day a good meridian altitude. The Nile passed over a reef with little room to spare, the rocks being plainly seen on each side, and the look-out aloft reported breakers on one side. The barque was only a few minutes between the rocks. Notwithstanding the difference in latitude, the two reports refer probably to the same reef. Should they be but one reef, the mean latitude would be $5^{\circ} 42' N.$, otherwise there may be a continuous reef or series of reefs between the above parallels.

Ifalik or Wilson Islands, a small group of four islets, lying on the edges of a lagoon about five miles in circuit, covered with cocoanut and breadfruit trees. The north-east point is in $7^{\circ} 15' N.$, $144^{\circ} 30' E.$

Wolea or Ulie Islands are a group of 22 islands. The southern point of Raour, the easternmost, lies in $7^{\circ} 20' N.$, $143^{\circ} 53' E.$ This group does not exceed six miles in extent.

The fatiguing uniformity of the coral islands has at least this advantage: that one description serves for all. But the Wolea Group differs from the others in this respect. Its figure is very irregular; it has two projecting angles to the north, and a deep indentation between them. According to the usual hypothesis of formation, this figure cannot be explained but by supposing that two independent groups were formed at the same time in this part. The channel of 12 yards between the islands of Angaligarail and Farailes seems to mark their separation. The reef, which extends thence to the south-east, reunites abreast of Motogozou to the reef running from Raour Island, thus completing the eastern group. At the same time a depth of $4\frac{1}{2}$ fathoms, and the reef extending east and north-east from Felalis, marks the direction of the prolonged reef, which would in time reach to Farailes, and form the western group.

Wolea or Ouleai occupies the north-east angle of the group, and is of an irregular triangular form, three-quarters of a mile in diameter. Its north extreme is in $7^{\circ} 22' N.$, $143^{\circ} 58' E.$

Palliou Island extends from its south-east extremity nearly true south, and is nearly connected with Raour Island, the south-easternmost of the group, the two together being $1\frac{1}{2}$ miles in length. On the west side of Raour are four or five artificial harbours, such as had not been seen in any other part of the Carolines. A jetty of large stones ran out for 100 yards into the sea, and at each side of its extremity another line of stones, projecting at an angle of about 60° , so that the whole has something the form of an anchor. From the south end of Raour the reef projects nearly half a mile. Between it and Tangoilap Island, two miles to the W.N.W., is Motogozou Islet, very small, and, like all the rest, surrounded by a reef, so that the anchorage in the eastern group has two entrances, one on each side of Motogozou.

Felalisse or Falalis Island, the south-west portion of the group, lies two miles south-west of Tangoilap. Between it and Motogozou there are some detached patches. The reef runs to the north-west three-quarters of a mile from Felalisse, leaving a navigable opening into the lagoon between it and Falulap or Faluclap, a small islet, one of a group which extends N.N.W. and N. $1\frac{1}{2}$ miles to Oulemeray, the north-west island of the group. Thence the chain is continued through Seliap and some smaller islands E.S.E. to Farailesse, between which and Langaligaraile is the very narrow but navigable channel before alluded to, forming a northern entrance to the lagoon.

Eauripik or Eourypyg, two islets, with a lagoon in $6^{\circ} 40' N.$, $143^{\circ} 10' E.$ They produce nothing but cocoanuts.

Sorol or Philip Islands, two small islands; the easternmost is the largest, and is five miles from the other. They are placed in $8^{\circ} 6' N.$, $140^{\circ} 52' E.$

Fais or Tromelin Island, a small low island in $9^{\circ} 47' N.$, $140^{\circ} 38' E.$ This island is the only one of the Carolines that has no lagoon; it is formed of madreporic rocks, 30 feet high, against which the sea beats immediately. It is $2\frac{3}{4}$ miles in circuit. No anchorage in any part.

Ulithi or Mackenzie Islands (native name, Ouluthy) —The group is of great extent, and consists of low coral islands, covered with cocoanut trees, and connected by coral reefs, forming a large lagoon inside, with many good passages through the reef leading into it.

The two small islands on the eastern group, Ear and Khilap or Hielap, are connected by a reef to each other and to others beyond. From them a shoal extends 15 miles to the S.E.

The western group, eight leagues in extent from North to South, is formed of a great number of small islands, Mogmog, Troilem, Falalep, etc., united by reefs. The two groups are separated by a channel eight miles broad.

The S.W. point of the eastern group, which may be taken as the centre of all the islands, is in $9^{\circ} 56' N.$, $139^{\circ} 50' E.$; and Mogmog, the northernmost of the western group, is in $10^{\circ} 6' N.$, $139^{\circ} 45' E.$ Captain Wilkes makes the East extremity in $10^{\circ} 8' N.$, $139^{\circ} 55' E.$

Eap or Yap (chart, Gouapp), is frequently made by ships taking the eastern passage to China. It is estimated to extend from North to South about $3\frac{1}{2}$ leagues; the North end lies in $9^{\circ} 40' N.$; South end, $9^{\circ} 30' N.$; $138^{\circ} 8' E.$ The southernmost land is low, but rises to the northward into hills. The island abounds in cocoanut trees. On the southern and western sides the reef is dangerous, and extends W.S.W., two leagues from the S.W. end of the island. It is steep-to, and some of the black rocks appear just above water near its extremity. It has an excellent harbour on the S.E. side, formed in an angle of the coast, by reefs. The entrance, through the reef, is about 200 yards wide, and can easily be made out from the mast-head when standing along the reef. Inside the channel widens, and trends more northward. The anchorage at the head of the harbour, off the village of Tomal, is perfectly safe, the holding ground good, and depth moderate. The South part of the island is low, but rises into hills towards the centre, which is moderately high. It is visible eight or nine leagues, and makes in three hummocks. This is now a depôt island for the collection of copra for the trading vessels.

HUNTER REEF, a narrow coral reef. Captain Hunter had 16 fathoms water on it, and saw the bottom distinctly. It extends nearly north and south, and is about seven leagues N. by E. of Yap; $9^{\circ} 57' N.$, $138^{\circ} 13' E.$

Ngoli or the Matelotas Islands.—The south islet is in $8^{\circ} 17' N.$, $137^{\circ} 33' E.$ From this to the north-east islet, which is in $8^{\circ} 35' N.$, $137^{\circ} 40' E.$, the reef on the eastern side, is at some distance from the south islet, in detached patches, and does not break with westerly winds. The reef extends six miles northward from the north-east islet; its north extreme is in $8^{\circ} 41' N.$ The western islet lies south-west by west from the north-east one, and is also surrounded by dangerous reefs. Their extent to the west and north-west has not been ascertained, but they probably connect the islets. There is a passage on the north-west side of the south islet leading to the lagoon, but the anchorage inside, if any, would be very unsafe. This is a most dangerous group, and should have a good berth in passing, particularly in hazy weather, or dark nights, as the islet cannot be seen above 10 or 11 miles in clear daylight, and strong currents often prevail in their vicinity. The southern islet is safe to approach on the south side, as no hidden dangers exist.

Elivi Island is marked on Imray's chart in $9^{\circ} 50' N.$, $138^{\circ} 15' E.$

Carolines.—"June, July, and August is the wet season, with squally weather. Went from Gouapp back to the Marshalls in these months, and had light westerly winds and counter current in 4° and $5^{\circ} N.$, but southward of this calms and westerly currents. Visited nine of these islands, all similar to the Marshalls, lagoon anchorages. A good trade with copra. At

Gouapp and Panapa (the only two high islands) the copra is collected by small vessels ready for the large ones. Gouapp will give 120 tons of copra per month. There is a good deal of trade with the China market."—Murray.

In this short account of the Pacific Islands it has been thought the better plan to omit all notice of the character of the natives, who, speaking generally, are never reliable. It is now well understood that they may be found and described as "friendly" by one vessel, while a succeeding one (owing perhaps to some occurrence in the interval) may meet a case of "massacre" or "cutting-out."

THE CORAL SEA, ETC.

The region it embraces is a very important one, and requires an amount of detail which this volume will not admit of. The Coral Sea is comprised between the north-east coast of Australia on the west and New Caledonia on the east; northward by the Louisiade Archipelago and New Guinea, and southward by the tropic or the parallel of 25° S. The navigation is of a dangerous character without due caution.

The surveys of Captain Denham, R.N., have, however, given us the true character of many of the reefs. Beginning southward—

CATO ISLET and BANK, a dry sandbank, 19 feet above high water, small, with little vegetation, and innumerable birds around it, is in 23° 15' S., 155° 33' E. Captain Denham erected a cone-shaped beacon 12 feet high on it. A bank with 10 to 30 fathoms extends five miles from all sides but the south. Hutchinson Reef, or rock, lies off its east side. H.W., F. & C., Sh.; rise, 6 feet.*

WRECK REEF is the central part of a chain of reefs, extending nearly east and west 20 miles. Bird Islet, on the east extreme of these reefs, is in 22° 10' 30" S., 155° 28' 40" E., and 12 feet above high water.

Wreck Reef has a sandbank on it, one-third of a mile in circuit, four feet above ordinary high-water level, in 22° 11' 20" S., 155° 19' E. On its north and north-west sides is anchorage in 18 to 25 fathoms, coral sand, at one to two cables' length from the reef. This chain consists of many distinct reefs, of different sizes; the six principal are from 4 to 8 or 10 miles in circuit, separated by channels from one to three miles wide.†

KENN REEF consists of four separate reefs, which form a curved chain, extending N.E. by E. $\frac{1}{2}$ E. $\frac{1}{2}$ miles from its south-western extreme to its eastern projection, thence nearly N.N.W. $\frac{1}{2}$ W. 10 miles to its north-western extreme; the western side thus forming a bay, on a bank of soundings in 5 to 37 fathoms, coral sand and rock, extending north-westward eight miles from the bight, outside which the depth suddenly increases to no bottom in 250 fathoms.

The south-easternmost and largest reef, dries at half-tide, and always breaks, is of triangular shape, extending from its eastern projection—on which is a high reef stone—S.W. by W. 4 miles, and N.W. $2\frac{1}{2}$ miles. The south-east and north-east sides of this reef are slightly embayed; the former was found by Captain Denham so strewn with wrecks as would suggest a lighthouse being erected on the reef, if it were fit to sustain such a structure and party. The western side is broken and irregular, with a five to seven fathoms inlet trending half a mile to eastward, and three-quarters of a mile northward into the shallow lagoon enclosed by the reef.

There are three slightly vegetated sand cays on the south-easternmost Kenn Reef, nearly in line N.E. by E. and S.W. by W., and $1\frac{1}{2}$ miles apart from each other. The central and largest does not exceed 150 yards in length, nor $5\frac{1}{2}$ feet above high water, in 21° 15' 44" S., 155° 48' 45" E. Captain Denham built a beacon on this cay from pieces of wreck found on it.

FREDERICK REEF, is $8\frac{1}{2}$ miles from north to south, awash on the south and east sides. Observatory Cay, on its south end, 5 feet above high water,

* Among the doubtful the following announcements may be placed:—

Australia Reef cannot be seen far off, as the sea is very smooth around it sometimes. It was not seen in the Herald, when 200 to 400 fathoms were found. Lat. 22° 45', long. 156° 6'. William IV. Island is placed on some charts in 24° 13' S., 151° 47' E., but it appears improbable.

† Carns or Mid-day Reef in 21° 58' S., 151° 20' E. A sounding of 220 fathoms, no bottom, having been found on the spot, it must be either Saumarez or Wreck Reef.

is in $21^{\circ} 1' 46''$ S., $154^{\circ} 24' 27''$ E. H. W. F. & C., 8h; rise, 6 feet. The southern portion encloses Anchorage Sound.

Anchorage Sound is nearly $2\frac{1}{2}$ miles wide between the north point of the southern Frederick Reef and Ridge Rock, and $2\frac{1}{2}$ miles deep, with regular soundings in 10 to 17 fathoms, coral sand, affording excellent anchorage, sheltered from the sea eastward, between N.N.E. and S.S.W., without any sunken danger up to within half a mile of the bight, near Observatory Cay.

SAUMAREZ REEF, an extensive bank or reef, separated from the projection of the Great Barrier Reef of Australia (Swain Reef) by a channel 30 miles broad, is 23 miles long north-east and south-west, and from three-quarters to a quarter of a mile broad. The north-east cay (8 feet high) is in $21^{\circ} 38' 11''$ S., $154^{\circ} 46' 41''$ E.

David Reef (?) in $19^{\circ} 20'$ S., $151^{\circ} 0'$ E., according to the chart, but there is no bottom with 230 fathoms on the spot.

Horse-shoe Shoal.—Its northern extreme is in $20^{\circ} 5'$ S., $151^{\circ} 50'$, the convex side southward extending 15 miles to the South and East, is perhaps a part of the Great Barrier Reef, more to the westward, as Captain Denham found a depth of 200 to 250 fathoms, sand, on the position.

KELSO BANK in $24^{\circ} 12'$ S., $159^{\circ} 27'$ E.; on the North end 25 to 13 fathoms were found. It was sailed over for two hours in a N.N.W. direction, the bottom being distinctly seen the greater part of the time, with large stones covered with seaweed.

Capel Bank reported from 32 to 40 fathoms, in $25^{\circ} 18'$ S., $159^{\circ} 20'$ E. It probably exists, and there may be others in this neighbourhood.

Bellona, Booby, Chesterfield, and Bampton Reefs.—A long line of reefs extending over three degrees of latitude, between 19° and $21^{\circ} 55'$ S., $158^{\circ} 15'$ and $159^{\circ} 35'$ E. The northern part is Bampton Reef and Chesterfield Reef, the centre is Booby, Minerva, and Ball Reefs, and the southern is Claudine and Bellona Reefs. They have been but incompletely examined, especially on their eastern face.

SOUTH BELLONA REEFS, two in number, awash at half tide, with a detached sand cay N. by W. $1\frac{3}{4}$ miles from the North extreme of the eastern reef. The West point of the western reef lies in $21^{\circ} 52' 22''$ S., $159^{\circ} 25' 30''$ E., whence it extends E. $\frac{1}{2}$ N. $4\frac{1}{2}$ miles, and is one mile to half a mile broad. The eastern reef, separated from the western reef by a 7-fathom channel half a mile wide, is five miles long N.E. and S.W., and $1\frac{1}{2}$ to 1 miles broad. It encloses a lagoon with four fathoms water between the coral patches in it, but appears to have no entrance. The northern extreme of this reef is rendered conspicuous by Nigger Head Rock—a black block of coral six feet square, and two feet above high water level. The Sand Cay, N. by W. $\frac{1}{4}$ W. $1\frac{3}{4}$ miles from Nigger Head Rock, in $21^{\circ} 47' 20''$ S., $159^{\circ} 34' 21''$ E., always shows brightly, and, being five feet above high-water level, it may afford temporary refuge to the crew of a vessel wrecked on the adjacent reefs, where there is no footing at high water.

MIDDLE BELLONA REEFS, two in number, E. $\frac{1}{2}$ S. and W. $\frac{1}{2}$ N. from each other, with a navigable opening between them. The western reef uncovers at half tide, and encloses a small lagoon, is $1\frac{1}{2}$ miles long N.E. and S.W., and one mile broad at the centre. Observatory Cay, the northern of these two reef points, in $21^{\circ} 24' 18''$ S., $158^{\circ} 52' 11''$ E., is a bright coral sand-bank, half a mile long east and west, and seven feet above high-water level; is the resort of birds, turtle, and whale near the reef. Captain Denham erected on it a barrel-post beacon. Western Breaker, W. by S. $\frac{1}{2}$ S. $5\frac{1}{2}$ miles from Observatory Cay, is a square cluster of rocks just below the surface, half a mile in extent. The sea breaks on it at long intervals. It is the more dangerous from its lying so far from the main reefs, and in the track of passing vessels; it should therefore be approached with due caution.

BOOBY REEF, N.W. extreme in $20^{\circ} 57'$ S., $158^{\circ} 31' 53''$ E., is six miles long N.W. by W. $\frac{1}{2}$ W. and S.E. by E. $\frac{1}{2}$ E., and about one mile broad, with some sunken patches close off its south-east end. With the exception of some black coral rocks, always four to six feet out of the water on its southern part, it is awash at half tide.

N.W. BELLONA REEF, the S.E. end, lies N. by W. six miles from the N.W. point of Booby Reef, is five miles long N.W. by N. and S.E. by S., and one mile broad, its N.W. point in $20^{\circ} 47' 36''$ S., $158^{\circ} 28' 8''$ E. It is awash at half tide.

Miller Reef was found to be in $20^{\circ} 51' S.$, $158^{\circ} 2' E.$, two miles N.W. and S.E. and one cable wide. Neap tides rose eighteen inches. The position is open to doubt.

CHESTERFIELD REEFS AND ISLETS, three long narrow barriers extending from $19^{\circ} 59' S.$, $158^{\circ} 30' E.$, north-westward 27 miles, to $19^{\circ} 37' 23'' S.$, $158^{\circ} 13' 20'' E.$ The south elbow is well marked by Loop Islet, 12 feet above high-water level, just within the reef, two-thirds of a mile northward of the outer edge of the elbow. Anchorage Islet, one of the windward of the group, with smooth and secure anchorage westward of it, is the southern of two islets on the eastern barrier, 38 feet above high-water level, and N. by W. $\frac{1}{4}$ W. five miles from Loop Islet. These islets and the dry sand ridges on the reef render it a natural breakwater from the eastward. The remaining five isles are Passage and Long Isles, and three small islets between them.

Avon Islets.—The southern lies in $19^{\circ} 32' S.$, $158^{\circ} 15' E.$, each 170 yards in diameter and 17 feet high; each islet fringed by a reef; no sheltered anchorage.

BAMPTON REEF is the western edge of a bank of soundings extending to the Chesterfield Reefs, the eastern limits have not been surveyed. It forms a narrow barrier, trending from its south point N. by E. 22 miles, when, after a turn of three miles eastward, it extends north by west seven miles to its north elbow in $19^{\circ} 1' S.$, $158^{\circ} 27' E.$ Here and there are clusters of reef-stones and an occasional solitary rock six feet high. H.W. F. & C. at 8 $\frac{1}{2}$ h., rise five and six feet.*

Brown Reef, a break reported in $17^{\circ} 38' S.$, $154^{\circ} 43' E.$ It had every appearance of a shoal, and should be guarded against.†

MELISH REEF AND CAY, a low sandy islet, eight feet above the water, half a mile long. A similar bank lies five miles northward. A beacon was erected on it by Captain Denham, 40 feet high. It is in $17^{\circ} 24' 39'' S.$, $155^{\circ} 52' 45'' E.$, about $5\frac{1}{2}$ miles long north and south, with deep water close round.‡

Westward of New Caledonia appears to be a series of detached shoals, which run in a direction somewhat parallel to it. More dangers may be found in the same line. Those hitherto announced are :

GRIMES SHOAL, placed on chart in $23^{\circ} 53' S.$, $161^{\circ} 10' E.$, described as having 70 fathoms least water on it.

Hamond Island, said to be in $22^{\circ} 30' S.$, $162^{\circ} 51' E.$

A rock, doubtful, in $24^{\circ} S.$, $160^{\circ} 15' E.$

Tamar Reef.—A dangerous shoal, in $21^{\circ} 21' S.$, $161^{\circ} 36' E.$, reported to extend a long distance to the N.W., but was sought for ineffectually by the Herald, when no bottom was found at 200 fathoms.

FAIRWAY REEF, lying nearly midway between the Bellona Shoals and New Caledonia, about $1\frac{1}{2}$ miles in circuit, awash at half tide, the rise being three feet. $21^{\circ} 0' S.$, $161^{\circ} 45' E.$

NEREUS SHOAL, in about $20^{\circ} 5' S.$, $160^{\circ} 30' E.$, is said to have two fathoms water on it. The Australian Packet, 1874, places it in $20^{\circ} 10' S.$, $160^{\circ} 5' E.$ (Chart gives $20^{\circ} 5'$, $160^{\circ} 3'$.)

New Shoal, very imperfectly laid down on the chart, is said to be in $20^{\circ} 55' S.$, $160^{\circ} 28' E.$ It is covered, but there is a heavy break on it.

The Ephemy reports standing within 100 yards of a shoal, with apparently three to four feet on it, extending E.S.E. and W.N.W., in $21^{\circ} 38' S.$, $162^{\circ} E.$ No break seen, sea smooth.

* Small whaling vessels which occasionally make the Bamptons their head quarters, anchor at the Chesterfield group.

† John Wesley Island—Reported in $19^{\circ} 16' S.$, $155^{\circ} E.$, volcanic, on fire all over : shoal water to the S.S.W. There is the greatest doubt as to this, but it must be inserted. A sounding of 230 fathoms no bottom has been taken in the locality.

‡ Young Reef, in the same latitude, but said to be in long. $155^{\circ} 20'$, is probably the same.

MIDDLETON REEF.—An extensive reef, covered at high water. Its west elbow is in $29^{\circ} 28' S.$, $159^{\circ} 4' E.$

Elizabeth Reef, within two cables' lengths of it, has 14 fathoms, hard rocky ground: at a quarter of a mile off it was 25 fathoms. The bank of soundings to 100 fathoms, on coral grit, extends $1\frac{1}{2}$ miles off. This dangerous reef lies 350 miles from Australia. It is oval shaped, nearly five miles long east and west, and $2\frac{1}{2}$ miles broad. The edges of the reef, with the exception of a few rocks, are covered at high water. The entrance to the lagoon, on the north-east side, is in $29^{\circ} 55' S.$, $159^{\circ} 6' E.$

A Life-Boat, moored in the lagoon for the purpose of succouring those wrecked on the reef, is provided with necessary articles for making a voyage to Australia, including provisions, medical stores, chart, compass, &c. Six casks of fresh water (each containing 15 gallons), are fitted as ballast as well as for use. It is requested that the following instructions be observed, viz. :— That shipwrecked mariners write a detailed account of their disaster, with the names of the survivors and those lost, also the place they intend to make for; this document is to be placed in the nun buoy, and left floating at the moorings. Navigators visiting the boat are requested to leave a report of their visit, with such intelligence as they may wish to communicate. If bound to an adjacent port they are requested to forward any reports that may be found in the nun buoy.

H.W. F. & C. at about 9h. ; rise at springs, 9 feet.*

Lord Howe's Island.—Mount Gower, on its southern end, is 2,834 feet high, in $31^{\circ} 36' S.$, $159^{\circ} 5' E.$ It is $5\frac{1}{2}$ miles long, N.N.W. and S.S.E., and from one-third of a mile to $1\frac{1}{2}$ miles broad. The eastern side consists of several bays; and the greater portion of the west side is fronted by coral reefs, between which and the shore are shallow lagoons, with not more than sufficient depth of water for boats, or other small craft drawing about five feet water.

Off the north end are the Admiralty Islets, a small group, distant about $1\frac{1}{2}$ miles. Nearer the shore are several other islets.

This group is surrounded by a bank of soundings, extending three to five miles off the west side, and seven to ten miles off its other parts.

Although there appears to be a proper depth of water at a convenient distance from the island, the anchorage cannot be considered good in consequence of foul ground, and of sudden and violent shifting gales. Sailing vessels should anchor in such a position as to clear the land on either tack, should the wind set in. Captain Denham's spot of observation at Middle Beach, North East Bay, is in lat. $31^{\circ} 31' 38'' S.$, long. $159^{\circ} 5' 18'' E.$ †

Pigs, poultry, and vegetables are procurable, and fish may be caught in abundance round the island. The island being covered with wood, a plentiful supply of fuel and trees fit for timber may be obtained. Water is most plentiful at the south end, and may be obtained all through the year at other parts of the island.

H.W. F. & C. at Sh. 30m. ; rise, six feet.

Ball Pyramid, in $31^{\circ} 45' S.$, $159^{\circ} 15' E.$, lies S.E. by E., 12 miles from Lord Howe's Island, is a remarkable peak, rising abruptly to the height of 4,810 feet from a rocky islet. Wheatsheaf and Observation Rocks lie half a mile westward of it; the former 185 feet, and the latter (northward of the Wheatsheaf) is 54 feet high. Two-and-a-half miles south-eastward of the pyramid is another rock, 20 feet high. It is surrounded by a bank of soundings, extending one to two-and-a-half miles westward, and five to seven miles in other directions.

* The following reported dangers may be considered not to exist:—Favourite Shoal in $26^{\circ} 6'$, $160^{\circ} 0'$. Lady Nelson Shoal, in $30^{\circ} 18' S.$, $161^{\circ} 6' E.$ Foster Tyans Shoal, in $31^{\circ} 56' S.$, $160^{\circ} 0' E.$, or about 30 miles E.S.E. of Balls Pyramid; a shoal, in $31^{\circ} 19' S.$, $160^{\circ} 42' W.$; and Middleton Island (or Sir Charles Middleton's Island), said to be very high, in $27^{\circ} 58'$, $159^{\circ} 30'$

† "Anchorage at Lord Howe's Island is safe in all winds, except N.E. and S.W. The anchorage is west and east of the island. The trade with this island appears to be on the increase."

AUSTRALIA, ETC.

It is only possible to give directions for one or two of the ports, with which the New Zealand trade is concerned, beginning with Port Stephens, as it might be used with advantage as a harbour of shelter when that of Newcastle is dangerous.

Sugarloaf Point Lighthouse is in $32^{\circ} 26' S.$, $152^{\circ} 33' E.$ A *revolving bright light* is shown from it, attaining its greatest brilliancy every half minute. It is 258 feet above the sea, visible 22 miles.

A lower *fixed green light*, visible three miles, is also shown between the bearings of South and S.E. by E. $\frac{1}{2}$ E., covering Seal Rocks and adjacent dangers, but not Edith Breaker, which lies S.S.W. $\frac{1}{2}$ W., three miles from Sugar-Loaf Point. Vessels should keep out of the range of the green light in rounding the point.

Port Stephens, from the offing of the port, makes in conical detached hills Yacaaba Head, on the north side of entrance, will be readily distinguished; as also Toomere Head, on the south side, the northernmost of four conical hills. The lighthouse on Stephens Point so clearly marks the entrance, as to prevent any mistake, by day or night.

STEPHENS POINT is a low rocky projection on the South side of entrance, sloping from a hummocky summit, and fronted by rocky ground.

THE LIGHTHOUSE on Stephens Point, in $32^{\circ} 45' S.$, $152^{\circ} 13' E.$, a white circular stone tower 60 feet high, on a knoll 66 feet above the level of the sea, shows a flash *white* and *red* light alternately, every minute, visible 17 miles from seaward, between the bearings of N.E. and S.W. by S., with the exception of a slight interruption by the islands off the entrance.

The light affords a good guide for vessels seeking shelter in Fly Road, between Stephens Point and Toomere Head; it is also a leading mark for entering between Toomere and Yacaaba Heads, as it does not shut in until it bears S. by E. $\frac{1}{2}$ E.

A light is also exhibited on Nelson Head on the South side of the harbour, a mile westward of Toomere Head. It shows *white* seaward, is *eclipsed* over the entrance shoal, is *red* within after the shoal is passed and when Nelson Head can be steered for, and again *white* when Nelson Head is passed; it can then be used as a guide for anchoring or proceeding further into Port Stephens; visible nine miles.

YACAABA, or North Head, a peaked hill of 810 feet high, with a steep descent to the sea on all sides, except at its junction with the mainland, with which it is connected by a very narrow and low strip.

TOOMEREE, or South Head, also rises abruptly to a height of 440 feet, with three equally conspicuous hills southward, all separated by low land. From Toomere Head a spit extends N.N.W. $3\frac{1}{2}$ cables, at its extremity the least depth is $2\frac{1}{2}$ fathoms, immediately deepening to four and five fathoms. A ground swell generally rolls on this spit, and frequently breaks on a nine-foot patch close within the extremity.

Off the entrance to Point Stephens are three islands; the northernmost and largest, Cabbage Tree Island, lies one mile north-eastward of Yacaaba Head, and partly shelters Providence Bay, northward of the Head, where vessels may ride securely during a southerly or westerly wind. The anchorage, however, in Fly Road, between Toomere Head and Stephens Point, is more safe should the wind veer eastward, as the port is under their lee.

The entrance to Port Stephens lies N.N.W. $2\frac{1}{2}$ miles from the lighthouse and W. $\frac{1}{2}$ N. from Boondelbah Isle, the southernmost of those off Yacaaba Head; it is two-thirds of a mile wide, the fairway channel is two-thirds over towards Yacaaba Head; nearer or farther according to the direction of the wind.

Approaching from southward, give the islet which lies close off the East extreme of Stephens Point, a berth of nearly half a mile, to avoid the rocky ground which extends a cable's length from it. The mark to keep without Toomere spit is Mount Stephen open of Toomere, $\frac{1}{2}$ S. by E. $\frac{1}{2}$ E., leading across the eastern tail of the Entrance Bank in 27 feet.

At night, vessels seeking shelter in Nelson Bay can run for the harbour light (*white*) until the revolving light on Point Stephens is lost sight of, when alter course to N.N.W. until the harbour light is lost sight of and again made out *red*; a course can then be shaped for it, and when the head is passed the *white* light will re-appear. Nelson Head may be passed within half a cable, if necessary, in 10 fathoms of water.

There is a telegraph station at Nelson Bay, as also at the lighthouse outside.

Newcastle Harbour lies somewhat embayed between Norah Head and Morna Point, S. by W. $\frac{1}{2}$ W. 24 miles and N.E. by E. 18 miles from the entrance. The coast is free from outlying dangers, with 13 to 22 fathoms two and three miles from the shore.

Nobby Head, connected with the mainland south-westward, by a breakwater half a mile long, is the southern head and rounding point of Newcastle Harbour, and lies in $32^{\circ} 55' 20'' S.$, $151^{\circ} 49' 8'' E.$ It rises abruptly to the height of 92 feet above high water mark: the summit is surmounted by a white lighthouse.

LIGHT.—Nobby Head lighthouse exhibits a *fixed white* light 115 feet above high water, visible 17 or 18 miles, between the bearings of N. by E. $\frac{1}{2}$ E. and S.W. by W., being shut in westward of the latter bearing by Morna Point.

The signal station on Nobby Head has two signal masts, bearing N.W. by N. and S.E. by S., which kept in line clears the north-eastern edge of the Oyster Bank. The commercial code and local harbour signals are both used, the latter to show the state of the tide, and whether it is prudent or otherwise to approach the harbour.

Vessels approaching, when able to read the signals exhibited must pay strict attention to their instructions, as it is impossible to get in against strong south, or south-westerly winds; serious consequences are likely to befall a vessel attempting to enter in defiance of these instructions. A south-east gale renders access to Newcastle Harbour difficult and dangerous.

Old Signal Hill, on which is the pilot's look-out station, rises abruptly at the south-west end of the breakwater. The two beacons on Old Signal Hill kept in line clear the Oyster Bank. Masters of vessels are particularly cautioned not to approach too close to the port without having been first boarded by a pilot, and to cause the usual signal to be made, of hoisting a union jack at the fore. Vessels requiring a pilot during the night should keep well to windward of Nobby Head, and burn a blue or flash-light, which will be answered by the watch at the pilot look-out station, on Old Signal Hill.

Whenever the pilot is outside and in a good position, he will burn a blue light, when the vessel requiring a pilot should take the bearing and steer in that direction, showing a light for the pilot's guidance.

Rocky spits and foul ground project two cables length from Old Signal Hill and from the next bluff south-westward; the Outer Ledges extend from Nobby Head one-third of a mile eastward, having their outer extremity in line with the signal station and the highest obelisk on the hill above the town, S.W. $\frac{1}{2}$ W. A rocky spit also extends a cable's length north-eastward from Nobby Head, in line with the head and signal station.

Entrance to Newcastle Harbour.—Haul-round Sand, the south-east spit of Pirate Point, forms the north line of Newcastle Harbour, and the Oyster Bank or North-west Sands bound the entrance of the harbour on the north-west side, the deep water, or four-fathom channel, being here little more than one cable wide.

The outer *red* or fairway buoy is moored in four fathoms, with the two obelisks on the high land above the town nearly in line, the lighthouse bearing E.S.E. distant $1\frac{1}{2}$ cables' length.

Two leading lights are shown from the obelisks on the hill over the town. A *white* light over a *red* light at night kept in line, S.W. $\frac{1}{2}$ S, leads in mid-channel clear of the 13-foot rock off the Boulder Point on the north-west side of the breakwater, and up to the black buoy off the Government boat-shed. By day the red and white towers in which the lights are placed answer as leading marks, the red tower being the upper one. This port should never be attempted without a pilot. Vessels with the signals flying are promptly attended on by both pilot and tug steamer.

N. by W. $\frac{1}{4}$ W. a quarter of a mile from Nobby Head lighthouse, on the north side of the channel, is a green wreck buoy. Many vessels have been lost, resulting nearly in every case through an endeavour to enter during south-east and easterly gales, which are always accompanied with incessant rains, causing strong freshets in the rivers. They raise a mountainous breaking sea at the entrance of the harbour, in a line from the outer end of the reef off Nobby Head (Big Ben) across to the eastward of the Oyster Bank. This mass of breaking sea would of itself be sufficient to overwhelm ordinary-sized vessels; but when, in addition a freshet of six or seven knots sets out of the river against this heavy easterly roll, to attempt to enter is almost certain destruction. It is, therefore, to be impressed on seamen, during a hard east or south-east gale, with rain that has lasted more than 24 hours, not to attempt to enter Newcastle, but either to keep to sea or make for Port Stephens. There are two lifeboats stationed at the port.

COAL.—There are steam cranes and loading shoots where vessels can load to 44 and 17 feet draught; above that, they must haul out to moorings in the Horseshoe, and complete to any draught under 22 feet by lighters. Steam tugs are employed constantly bringing vessels in and out, and moving them in the harbour. A patent slip at Stockton, on the north shore of the harbour, is capable of taking up ships of 300 to 1,000 tons.

PORT JACKSON.

Approaching Port Jackson from eastward, the northern of the two Sydney Heads will, in clear weather, be first seen (being higher than the adjacent coast); as the port is neared, the lighthouse and signal station on the Outer South Head, and the bold, perpendicular profile of the North Head.

Outer South Head, on which are the signal tower, semaphore and flagstaff, is a precipitous projection of the coast, 300 feet above the sea.

LIGHT.—The Outer South Head lighthouse is a white circular stone building, 76 feet high, near the edge of the cliff, a quarter of a mile southward of the signal station, in $33^{\circ} 51' 15''$ S., $151^{\circ} 18' 15''$ E. It exhibits a *white* light, revolving every $1\frac{1}{2}$ minute, 344 feet above the level of high water, visible 25 miles seaward, between the bearings of N. by W. and S. by W. $\frac{1}{4}$ W.

From the Outer South Head, the cliffy coast line trends N.N.W. $\frac{1}{2}$ W. one mile to Inner South Head, which forms the rounding point on the southern side of the entrance.

The Gap, midway between the Outer and Inner South Head lighthouses, is so remarkable that it has in a dark night even been mistaken for the entrance.

Inner South Head.—From Gap Bluff the ridge descends to the Inner South Head, 60 feet above high water, with a lighthouse on its extremity.

LIGHT.—The Inner South Head lighthouse, intended for actual guidance into the harbour, after the lofty outer lighthouse has shown proximity, is a dwarf tower painted red and white in vertical stripes, 30 feet high. It shows a *fixed white* light 30 feet above high water, visible 15 miles from the eastward, between the bearings of N.W. by N. and S.W. $\frac{1}{4}$ W. The light suddenly opens out from Gap Bluff upon the former bearing, if coming from southward, when abreast of, and $5\frac{1}{2}$ miles off Botany Bay Heads.

South Reef, a ledge of rocks extending a cable's length northward from the base of Inner South Head.

The Outer North Head is a table, perpendicular cliff, N. by E. $\frac{1}{4}$ E., $1\frac{1}{2}$ miles from

the South Head signal station. Inner North Head, W. $\frac{1}{2}$ N. nearly three-quarters of a mile from the Outer head forms the north side of the entrance.

Entrance of Port Jackson.—The narrowest part is between the Inner Heads, three-quarters of a mile across N. by E. $\frac{1}{2}$ E. and S. by W. $\frac{1}{2}$ W. The entrance is clear of dangers, soundings regular, the depth in mid-channel 17 fathoms sand.

Middle Head, W.N.W., two-thirds of a mile from Inner South Head, is a precipitous, whitish bluff facing the entrance. The sea breaks violently on it in easterly gales.

Two obelisks, each 30 feet high have been erected on the western shore, facing the entrance; that nearest the sea is at the edge of the coast, immediately southward of Middle Head; the western and upper obelisk on the wooded slope, bears W. $\frac{1}{2}$ S. from the former. These two kept in line give the leading mark for clearing the south reef and the northern edge of the Bar and Flats. (Mark A.)

The Bar and Flats and Sow and Pigs, which extend across the mouth of the harbour, admit vessels of 20 feet draught at low waterspring tides, or 25 feet at high water, in fine weather. The nucleus of this bar, a group of rocks, showing at half tide, is marked by an iron beacon rod, surmounted by an open hooped ball, nearly midway between the shores on either side.

The Sow and Pigs light-vessel, painted red, is moored in 21 feet water, half a cable's length north-westward of the outer or north extremity of the Sow and Pigs Shoals and one cable from the beacon. The light-vessel shows a red flag by day, and two fixed white lights, placed vertically $6\frac{1}{2}$ feet apart upon mast by night; the upper light 26 feet above the water is visible from the north-eastward in clear weather 6 miles.

The Western Channel across the Bar and Flats on the western side of the Sow and Pigs Shoals carries 21 feet at low water, over a sandy bottom. The light-vessel is situated so as to render this the available night channel, which may be taken without a pilot in moderate and clear weather by anyone who has studied the plan and directions.

Leading marks for clearing the shoals on either side of the Western Channel:—Bradley Point on the north side of the harbour, in line with Elizabeth House, an imposing white square building, with a round dome, S.W. by S., clears the 16-foot patch on the northern edge of the Bar and Flats and the Sow and Pig Shoals, on their western sides. (Mark C.)

The spire of a chapel at Wooloomooloo kept a little open of Bradley Point S.S.W. $\frac{1}{2}$ W. leads through the west channel and clear of the shoal water off George head. (Mark D.)

Watson Bay, south of the Inner South Head (the pilot station) has smooth anchorage in six to seven fathoms; outward-bound vessels frequently anchor here to wait for a fair wind.

Eastern Channel, with equally deep, and much smoother water, is but half the distance as compared with the Western Channel. The outer narrows (where the soundings quickly decrease from eight to four fathoms) between the south reef and the north-easternmost 16-foot patch of the Sow and Pigs Shoals, is nearly a quarter of a mile wide; the leading marks for, and through the centre of the channel are the two eastern obelisks of white stone, half a mile apart, one on Green Point, the other on Vaulcuse Point, in one S. $\frac{1}{2}$ E. (Mark B.)

St. James Church spire—the only spire which makes out in Sydney—its breadth open of Bradley Point, bearing S.W. $\frac{1}{2}$ W., leads clear of the south-eastern 17-foot elbow of the Sow and Pigs Shoals. (Mark F.)

The Outer South Head Lighthouse, its breadth open to the southward of the red and white chequered obelisk, upon the wooded slope near Watson Bay, S.E. by E. $\frac{1}{2}$ E., shows that the south-western, or inner edge of the Bar and Flats have been passed. (Mark E.)

Port Jackson, above the Bar and Flats, is so free from dangers, and clearly represented on the plan, that there will be no difficulty in proceeding toward the city.

If a vessel bound to Port Jackson should be uncertain of her latitude, and fall in with land either southward or northward, in blowing weather, she may find shelter either in Botany Bay, 10 miles southward, or Broken Bay, 16 miles northward of Port Jackson; and it is of the utmost consequence that such vessels as may happen to be in bad condition, and unable to keep off shore, should be aware of these useful places of refuge.

Vessels approaching in the night, with southerly or westerly winds, should keep the sea until daylight; but with winds from northward or eastward and favourable weather, they may safely enter.

Coming from southward, if the weather be dark or thick, preserve a good offing until the Sydney Heads or Outer South Head Light is seen, in order to clear the projection of the coast about Botany Bay, where it is comparatively low, and where the current sometimes sets S.W. towards the shore.

BASS STRAIT.

Bass Strait separates Australia from Tasmania. On the south side is a group of islands, of which Flinders or Great Island is the principal. N.W. of this is a small cluster, the Kent Group; on the eastern of which, Deal Island, is a conspicuous lighthouse. The light is 80 feet above the sea, revolves once in a minute, and has been seen 37 miles off, but being so elevated, is frequently obscured by fogs.

The northern side of the strait is well marked by night, by a fixed light, on the south extreme of Wilson Promontory. The channel between Kent Group and Wilson Promontory has several dangerous rocks in it.

Southward of the Kent Group is another channel, which also requires caution, as

there are two reefs between them and the north end of Flinders or Great Island, the Beagle Reef just awash, 3 miles E. $\frac{3}{4}$ S. from Endeavour Reef, and in a line with it and Wright Rock. Endeavour Reef is 2 $\frac{1}{2}$ miles from Wright Rock. These and a sunken rock, a mile East of Craggy Island, are the chief dangers in this channel. The extremes are marked north and south by Wright Rock and Craggy Island, between which ships should not pass.

Wright Rock, 209 feet high, is small and conspicuous. Craggy Island is small and clifty, but free from danger.

Banks Strait is south of Flinders Island Group. It is believed not to have any dangers, except near the land. By night its navigation is facilitated by the *revolving light* on Swan Island (see below). The *fixed light* on Goose Island, the westernmost of the Chappell Islands, marks the N.W. entrance. A light is proposed at Eddystone Point, the N.E. cape of Tasmania (see below).

The winds are commonly favourable for making a passage westward, through Bass Strait, and along the south coast, in the months of January, February, and March.

The following observations by Captain Flinders may be acceptable:—The first remark is, that the three months when this passage is most easy to be made, are precisely those in which it is unsafe, if not impracticable, to go through Torres Strait; and the second, that it will generally be of no avail for a ship to be in Bass Strait before the middle of December, and if it be the middle of January it will be preferable.

Ships from the north-eastward may take a departure from Cape Howe; but from thence should not steer westward of S.S.W. until in 39° 30' S., on account of the danger from S.E. winds upon Long Beach. Having reached 39° 30', steer about W. by S., leaving the Sisters, Craggy Islet, and Wright Rock to the southward. Deal, the easternmost island of Kent Group, marked by the lighthouse in 39° 29' S., 147° 22' E., seen 10 or 12 leagues in fine weather, will come in sight ahead; and in passing three or four miles on its south side the other islands of the group will be seen, and are to be passed in the same way; as are Curtis Island and Sugar-loaf Rocks, which will then be in sight. From Curtis Isles to the North end of King Island, with its *bright fixed light* at night, the course is nearly W. by S., 42 leagues, with nothing in the way; but it is better to steer five or six leagues northward of King Island, if the winds permit.

In case of foul winds, which, if the weather be thick or rainy, may be expected to fix at S.W. and blow strong, there are many places where a ship may anchor to wait a change; the following appear most convenient:—1st. West Cove in Erith Island, Kent Group. 2nd. Hamilton Road, at east end of Preservation Island, between Swan Island and Goose Island lighthouses. 3rd. On the south side of the largest Swan Island (with its lighthouse) for small vessels, or under Waterhouse Island westward. 4th. Port Dalrymple. 5th. Port Sorel (accessible only to small vessels). 6th. Various places among the Hunter Group. 7th. Sea Elephant Bay, east side of King Island (fresh water), or under N.E. end of island, if the wind be S.W. 8th. Western Port, under Grant Island, anchoring as soon as ship is sheltered. A fair wind onward through the Strait will take a ship out of this port. 9th. Port Phillip.

Commanders of iron ships, especially of those newly built, are cautioned as to the necessity of ascertaining the errors of their compasses on approaching the Australian coast.

Northerly or N.N.E. winds are as a rule followed by West and S.W. winds.

The very variable weather and sudden changes of wind met with in this Strait render caution necessary, both in taking up any anchorage that is not well sheltered, and in quitting it so soon as the wind blows in from seaward.

The Island of Tasmania is 170 miles long and 160 broad.

The north coast forms the south side of Bass Strait, and lies generally in smooth water, the prevailing winds being off the land. Its navigation is represented to be free from dangers to within a mile of the shore, and of the islands which lie off it; except in the neighbourhood of Port Dalrymple.

Eddystone Point (on which it is proposed to erect a lighthouse), on the N.E. coast of Tasmania, in 40° 59' S., 148° 22' E., projects a mile from the line of coast, with dry and sunken rocks, a mile off the point.

Swan Island Lighthouse.—On the N.E. extreme of the largest Swan isle, in 40° 43' S., 148° 8' E., is a round tower 71 feet high, the upper part painted *red*, the lower *white*. It exhibits a light revolving every minute 110 feet above the level of the sea, visible in clear weather 14 miles.

There is a tolerable anchorage on the south-east side of the largest Swan isle, in 6 or 7 fathoms, a quarter of a mile off the South point of a sandy bay, where vessels may wait for tide, or a short time with north-west winds; but there is a better anchorage off the mouth of Little Muscle River south-eastward, where a vessel can more easily get under way in south-east or easterly winds.

Salamander Rock, with 10 feet water over it, lies E. by S. $\frac{1}{4}$ S., 12 $\frac{1}{2}$ miles from Swan Island Lighthouse, in 40° 50' S., 148° 21' E. Harry Rock, with three fathoms water over it, lies N.W. by W. $\frac{3}{4}$ W., three miles from the lighthouse.

Port Dalrymple, the principal harbour on the north coast of Tasmania, forms the entrance of Tamar River.

Coming alongshore from eastward, Ninth Islet, and afterward Stony Head, with Tenth Islet off it, show the vicinity of the port; and Low Head, with the conspicuous red and white lighthouse on it, will be seen in the light to the S.S.W. It exhibits a *bright light revolving* once in 100 seconds.

The entrance between Low Head and French Point, which lies S. by W. $\frac{3}{4}$ W. 1 $\frac{1}{2}$ miles from the head, is difficult of access, on account of the reefs and banks

which extend a considerable distance from the western side of the entrance; strangers should therefore avoid that side, and endeavour to enter by Low Head. The greater part of these shoals (and those within) are covered at half tide, so that with the flood, or even a little before, is the best time to enter, as almost the whole of the dangers are then visible.

Hebe Reef, the outermost danger off the entrance, lies West $2\frac{1}{2}$ miles from Low Head Lighthouse.

Middle Ground, the most formidable shoal in the entrance, is a rocky patch between W. by S. and S.W. 4 and $6\frac{1}{2}$ cables' length from the lighthouse, with 9 to 12 feet on one spot at low water springs. The north extreme of Low Head in one with the first black cliffy projection eastward of it, or the flagstaff on Low Head open to the northward of the lighthouse, clears its northern edge; its south-west edge is marked by a *black* buoy, S.W. $\frac{1}{2}$ W., six cables from the lighthouse.

East Channel, between the Middle Ground and the shoal which borders the west side of Low Head, is one-third of a mile wide in the outer part, not safe for strangers without a pilot.

West Channel, the main entrance formed by the Middle Ground to the north-east, and Yellow Reef to the south west, is nearly two cables wide, with depths of 22 to 10 fathoms; it is recommended as being the safer channel. When within six miles of the entrance, bring the lighthouse on Low Point E. by S. until the two towers on Lagoon Beach are visible; then bring them in line E.S.E., and steer in.

The two towers in the line lead three cables north-eastward of Hebe Reef, and through the West Channel, midway between the *white* buoy of Yellow Reef on the starboard, and the *black* buoy of Middle Ground on the port hand. Having cleared the West Channel, proceed for good anchorage in six or eight fathoms, abreast Lagoon Beach, taking care to avoid the spit which projects from Barrel Rock Beacon, and, if a vessel of great draught, the 3-fathom bank immediately southward of it.

Pilots may always be obtained off Port Dalrymple, when the weather will admit of their going off; and should the weather be too bad, the boat will be lying in mid-channel, with the flag flying.

Launceston is situated at the head of Tamar River, 35 miles from the sea. Vessels of 17 or 18 feet draught can go within half a mile of the town, below the bar. A steam tug, maintained by the Marine Board, is available for towing vessels, at moderate rates.

Derwent River has two approaches, from the S.W., through D'Entrecasteaux Channel, and by Storm Bay, between the northern part of Bruny Island and Tasman Peninsula, 12 miles eastward of it; the latter is much to be preferred. From the westward through stormy Bay, give Tasman Head, the south point of Bruny Island, a good berth, to avoid Friar Rocks. Proceeding northward past Fluted Cape, steer so as to pass on the west side of Iron Pot Lighthouse, the upper part of which is painted red, the lower white. It shows a *fixed* light at 65 feet elevation. In approaching the Derwent the generally strong prevailing westerly winds make it desirable to keep within a mile of Bruny Island. Having entered Derwent River between Cape Delasorte and Iron Pot Lighthouse, keep the western shore aboard, steering N. by W. $\frac{1}{4}$ W. and N. by E. up to a quarter of a mile off Dead Tree Point, thence N.W. for Sullivan Cove, the usual anchorage off Hobart Town, where vessels may come to as convenient; but one anchor should be laid out well to the S.E. for the convenience of getting under way. From the middle of the entrance the cove extends W. by S. a little over two cables to the steamship pier, on which is a *red* light. There are no dangers, so that vessels may work in or out without a pilot, tacking about a quarter of a mile off shore, and may anchor anywhere, on muddy bottom.

Hobart Town, the capital of Tasmania, is situated at the foot of Mount Wellington, on the Derwent, 12 miles from its mouth. The harbour is easy of access, well sheltered, with sufficient depth of water for vessels of the largest tonnage; ample dock and wharf accommodation for loading, discharge, and repairs of ships. There are three first-class patent slips available for vessels of considerable size.

Fort Mulgrave, at which is a signal-station, is one cable south-westward of the southern entrance point of Sullivan Cove, 85 feet above the sea. The flagstaff is in $42^{\circ} 53' 32''$ S., $147^{\circ} 21' 20''$ E.

H.W. F. & C. 8h. 15m.; spring rise $4\frac{1}{2}$ feet, and neaps $3\frac{1}{2}$ feet. The tides are exceedingly irregular. The flood is barely perceptible between Iron Pot Islet and Kelly Point, but runs stronger under Mount Louis, thence at the rate of half a knot. Between Macquarie and Montagu Points the ebb runs south $1\frac{1}{2}$ knots at half tide; off Battery Point it runs S. by E. sweeping south-eastward round Sandy Bay, at the rate of three-quarters of a knot, and thence to half a knot towards the entrance.

THE COAST OF VICTORIA.

Cape Schanck and Light.—On the north side of Bass Strait, 89 miles N.W. by W. $\frac{1}{4}$ W. from the extremity of Wilson Promontory, is Cape Schanck, on which stands a lighthouse, showing a bright fixed light, varied by a bright flash every two minutes, elevated 238 feet, and visible 25 miles. The cape is the southern extremity of the peninsula which separates Western Port from Port Phillip, 16 miles to the north-westward.

Port Phillip is situated at the head of an extensive bight between Cape Otway and Wilson Promontory, 130 miles eastward of the cape. In approaching the port from the westward, the entrance is not easily distinguished until Nepean Point, the

eastern entrance head, bears N.N.E., when Shortland Bluff, on which the highest and leading lighthouses are erected, shows out, and the estuary becomes visible. If Barwon Head is previously seen, the entrance of Port Phillip is easily found.

Port Phillip extends 32 miles north and south, and is 18 miles wide, exclusive of an arm which trends 16 miles in a W.S.W. direction to Geelong. The entrance is less than two miles wide, and nearly one-half of it is occupied by rocks and shoals.

Point Lonsdale, the western head of the entrance to Port Phillip, is low, and juts out from a dark rocky cliff. It is not so high nor so well marked as Nepean Point, the eastern head, but can be easily distinguished by a light and look-out house, a telegraph station, a tidal flagstaff, and a *red* beacon, near its south-eastern extremity. Lonsdale Reef, the greater part of which dries at low water, projects a quarter of a mile south-eastward from Point Lonsdale, and is about one cable broad.

The Light on Point Lonsdale, visible 10 miles, is a fixed *green* and *red* light. The *green* light is visible seaward when bearing about N. by W. to N.W. $\frac{1}{2}$ W., and the *red* towards Nepean Point, and the harbour when bearing N.W. $\frac{1}{2}$ W. to W. by S.

Vessels having the *green* light in sight will be outside, and with the *red* in sight, inside the Lonsdale and Lightning Rocks, which bear S.E. $\frac{1}{2}$ E. distant respectively nearly two-thirds of a mile and one one-tenth mile from the light. The blending of the two colours, when seen from a vessel, will show that she is in the vicinity of, or in a line with, these dangers; great caution will therefore be necessary before these colours begin to blend.

PILOTS.—There is a most efficient pilot establishment at Port Phillip Heads. The pilot vessels cruise outside, borrowing on either shore according to the weather. They carry a *red* and *white* flag in horizontal stripes, and at night, a bright light at the foremast-head, and show a flash every half-hour.

TIDAL SIGNALS are shown at Point Lonsdale, denoting the quarter of the tide with reference to the stream. The period of slack water is very limited. The stream turns from two to three hours after high and low water by the tide.

The Flood, during the first quarter, is denoted by a blue flag half mast.

“ “ second quarter “ at mast-head.

“ “ third quarter “ red flag half mast.

“ “ fourth quarter “ at mast-head.

Ebb.—The same as above, with ball below the flag.

Nepean Point.—The eastern entrance head has a *white* beacon on its extremity.

Nepean Reef projects west two cables from Nepean Point to Nepean Rock, a small islet, on which is a *red* cone-shaped beacon; thence a continuation of the reef and several pinnacle rocks outside it, extend $3\frac{1}{2}$ cables further westward to Corsair Rock, 150 feet N.N.E. of which is a small detached rock, with 10 feet water on it, Nepean Reef dries at low water out to the islet, the remainder has from one to three feet water.

Corsair Rock, the outer end of Nepean Reef, 20 feet in diameter, with 11 feet water over it, and four to six fathoms close to; lies with the *red* beacon on rocky islet in line with the *white* beacon on Nepean Point, bearing east, the *red* beacon distant $3\frac{1}{2}$ cables.

ENTRANCE.—The navigable channel is a little less than one mile in width between the reefs that project from Lonsdale and Nepean Points. Lonsdale and Lightning Rocks, with three fathoms over them, are the shoalest heads of a rocky bank, with $5\frac{1}{2}$ to 7 fathoms on it, extending $1\frac{1}{2}$ miles S.E. by E. from Point Lonsdale, and stretching completely across the entrance.

Outside the bank there are 9 to 15, and inside 10 to 29 fathoms. This inequality, with tide streams at times running five to seven knots, causes the well-known Race, or “Rip,” between Port Phillip Heads, which during, or immediately after, a south-westerly gale, breaks so furiously as to be dangerous to small vessels.

Vessels drawing less than 14 feet may, in day time, pass between Lonsdale Reef and Rock, by keeping Swan Point just open east of Shortland Bluff, bearing N.E. Swan Beacon touching the cliff at Shortland Bluff, N.E. $\frac{1}{2}$ N., leads half a cable eastward of Lonsdale Rock.

The two lighthouses on Shortland Bluff in line, N.E. by N., lead in the fairway through the entrance into Port Phillip.

The Lightning Rocks are cleared northward and southward by keeping Point Lonsdale mast open on either side of Point Lonsdale telegraph house, which is *white*, with a slate roof; the *red* obelisk on Shortland Bluff touching the east side of the high lighthouse, nearly N.E. by N., clears them to the westward.

The Corsair Rock, off Nepean Point, is cleared by keeping the low lighthouse on Shortland Bluff in line with the east end of the light-keepers' houses, near the high lighthouse N.N.E. $\frac{1}{2}$ E., until the *white* beacon on Point Nepean is well open northward of the *red* beacon, going in, or well open southward, going out.

Shortland Bluff, on which are two lighthouses and a *red* obelisk, with the township of Queenscliff in their rear, is the S.E. extreme of a peninsula projecting nearly two miles north-eastward from the coast.

LIGHTS.—The high lighthouse on Shortland Bluff, N.E. $\frac{1}{2}$ E., $2\frac{1}{2}$ miles from Point Lonsdale, is 63 feet high, built of blue stone. It exhibits a fixed *white* light, 130 feet above the sea level, visible from seaward, on any bearing between about east, by N.E. and north, 17 miles; when close in with Lonsdale land it will only be seen when bearing between N.E. by E. and north, and when within the heads from N.E. by E. round by north and west, to S.W. by W.

The low lighthouse tower, painted *white*, stands S.W. by S. 352 yards from the high lighthouse, and at 90 feet above high water level exhibits a fixed *red* and *white* light, showing *white* when bearing from about N.E. by E. to N.E., *red* from N.E. to N.N.E., and *white* from N.N.E. round by north to W. by N. The *white* light should be seen in clear weather 14 miles, the *red* 10 miles.

Vessels entering between Port Phillip heads should keep the *red* light in sight, and steer in with it bearing N.E. by N., and in line with the high *white* light. The change of colour from *red* to *white* indicates an approach to the Lonsdale Reef on the west, and Nepean reef on the east side of the entrance.

The *white* light between the bearings of N.E. by E. and N.E. shows over the dangers extending from Point Lonsdale. Between the bearings of N.N.E. to W. by N. the *white* light shows over the Corsair Rock to a line from the low lighthouse along the north side of and through the South Channel, passing southward of Pope's Eye *red* buoy, along the *black* buoys, and northward of the *white* buoys, which mark the north and south sides of the channel, so that vessels during the night, with light winds or adverse tide streams, will be aided by a bearing of the light. N.N.E. half a mile from the high light, Queenscliff Jetty projects about 130 yards from the shore, and has a fixed *green* light at its end, visible four miles; this is a life-boat station.

Swan Island, low, is separated from the north-east point of Shortland Peninsula by a shallow opening 100 yards wide, communicating with Swan Bay westward. From this opening the south side of Swan Island trends E.N.E. $1\frac{1}{2}$ miles, thence the eastern end sweeps three-quarters of a mile northward, round Swan Point, to the north-east extreme of the island. Swan Beacon, which, when touching the cliff at Shortland Bluff, leads clear of Lonsdale Rock, is *white* with a *red* top, near the south-east extreme of the island, the high lighthouse on Shortland Bluff bearing nearly S.W. $\frac{3}{4}$ S., a little less than two miles. To clear the edge of the bank off the island and the 7-foot rock on it, keep Lonsdale lighthouse open of Shortland Bluff.

SWAN SPIT LIGHTHOUSE, a wooden building on piles, on the south-eastern edge of the bank just noticed, bears E.S.E. two-thirds of a mile from Swan Beacon. It is painted *red*, and exhibits fixed *red* and *white* lights, visible eight miles, showing *white* when bearing from about E.N.E. to N.E. $\frac{1}{2}$ E., *red* from N.E. $\frac{1}{2}$ E. to N.E. $\frac{3}{4}$ N., *white* from N.E. $\frac{3}{4}$ N. to N. by W. $\frac{1}{2}$ W., and *red* from N. by W. $\frac{1}{2}$ W. round by west to S. $\frac{1}{2}$ W. The *red* light in sight between N.E. $\frac{1}{2}$ E. and N.E. $\frac{3}{4}$ N., indicates the entrance to the west channel between No. 1 *black* buoy and the *white* perch on the Royal George Shoal. A gong is sounded every 10 minutes in thick or foggy weather.

Vessels should not approach near to the Swan Spit Lighthouse. It is impossible to give *in extenso* the directions for the interior of Port Phillip. The above will take a vessel in in case of necessity.

DIRECTIONS.—Vessels steering for Port Phillip from the southward and eastward usually make the land about Cape Schanck, 17 miles south-eastward of the entrance. The cape has a round *white* lighthouse on its highest part, which exhibits a fixed and flashing light, visible in clear weather 23 miles. Having passed Cape Schanck, keep a good offing in proceeding towards the heads until they open out Shortland Bluff lighthouses, which the intervening land of Nepean Point prevents being seen before the high fixed light bears N. $\frac{1}{2}$ W., and the low light N. $\frac{1}{2}$ E.; in proceeding, to bring the two lights in line, the low light will change its colour from *white* to *red* on a N.N.E. bearing.

To ensure passing outside the Lightning Rock, the lighthouse on Point Lonsdale should not be brought westward of north-west until the two lighthouses on Shortland Bluff are in line.

CAUTION NOT TO HEAVE-TO.—At night a vessel should keep a good offing, and on no account be hove-to when waiting for daylight near Port Phillip Heads. Several vessels that have done so have drifted into danger.

CAUSES OF WRECK AT THE HEADS.—A careful inquiry has shown that in nearly every case they have taken place in consequence of the vessel either attempting to enter the heads at night without a pilot, or against a strong ebb stream. The mariner must not suppose because he has a fine fair wind outside the heads he can always force his vessel against the ebb. To this error is attributable the loss of several vessels. The wind, although fresh outside, frequently falls light just as the vessel gets into the tide ripple between the heads, when she becomes unmanageable; and, even with a strong breeze, vessels often sheer athwart the tide, which hereabouts forms a series of strong irregular eddies.

TO ENTER THE HEADS WITH THE FLOOD.—Should a pilot not have been taken on board outside the heads, and the last quarter ebb signal be up, or the flood stream be made, steer to bring the high lighthouse on Shortland Bluff to bear N.E. by N., in line with the low lighthouse; and with a fresh fair wind and flood stream steer so as to keep the two lighthouses in line, until the *red* beacon on the rocky islet off Point Nepean is open to the southward of that point.

With a scant or light easterly wind and flood stream, Swan Island beacon must be kept open of Shortland Bluff, so as to avoid Lonsdale Rock.

AT NIGHT.—The passage through the heads should not be attempted at night, except with steam or a commanding fair wind.

ANCHORAGE.—Having entered and cleared the dangers which lie between the heads, a vessel may proceed north-eastward for the anchorage off Shortland Bluff. Strangers entering from stress of weather should not attempt to proceed above this without a pilot.

OFF SHORTLAND BLUFF.—If necessary to anchor off Shortland Bluff, steer north-eastward from the entrance, keeping Swan Spit light open of Shortland Bluff, to avoid the Victory Shoal; if of heavy draught, anchor on the south-east side of the fairway, which is shown in the day time by Swan Spit lighthouse being just open west of No. 2 *white* perch buoy; at night by Swan Spit light changing from *red* to *white*, N.E. $\frac{3}{4}$ N.

WINDS—HURRICANES—CURRENTS.

The following necessarily short description is mainly from Findlay:—

Even small areas of land have a very marked effect on the regularity of the trade winds. The aggregation of minute spots in the coral groups, as in the Low Archipelago or the Caroline Islands, is sufficient, apparently, not only to intercept their regular course, but even to reverse it, as the winds frequently blow in opposition, not only in a partial manner, but for considerable periods, and over a very great extent.

The Pacific Ocean may be divided into three belts—the inner and extra tropical zones—in the former of which the trade winds are dominant; in the latter the anti-trade or passage winds, from the westward, the “brave west winds,” as they have been called, are permanent. *General*.—“The trade winds are separated into those that blow from the north-east and south-east, which meet and neutralize each other near the Equator; with a neutral line of calms and varying winds, known as the ‘doldrums.’ The belt of calms follows the sun in his annual course. The whole system of wind and calm belts move northward from May till August; they then remain almost stationary till the approach of winter, when they commence to go southward, and proceed in that direction from December till February or March.”

It has been considered that the trade winds blow regularly over the entire breadth of the Pacific, but this is incorrect, and in the South Pacific especially there is a great variation from this. The south-east trade in fact is only felt with certainty over that portion where there is no land, or between the meridians of the Galapagos and the Low Archipelago—not one-half its extent. In the North Pacific, on the contrary, the north-east trade blows as far as the Marianas, where the regular monsoons supersede it. In the western parts of the South Pacific there are also regular monsoons, though of a less decided character. The south-east trade is only constant among the archipelagoes between the Paumotu's and Australia, between March and October; during the rest of the year they are interrupted by westerly winds, calms, storms, and rains. The extent of the trade winds in latitude is usually considered to be from 30° S. to 30° N., but this statement must be received with great limitations. It sometimes occurs that the two trade winds meet each other without any intervening space of variables or calms. In crossing the equatorial belt, a direct north or south course as far as practicable is the best, being traversed with the least distance.

In the anti-trades, or extra tropical winds, in the southern hemisphere, as far as the antarctic circle, from the southern edge of the south-east trade, westerly winds will be found with more or less force and irregularity at all seasons, remembering that, like other winds they blow towards the sun, that is frequently southward of west in the winter, and more northward of west in the summer of the southern hemisphere.

THE SOUTH-EAST TRADE WIND.

Many singular anomalies are observed in its course over the islands. At the Marquesas, lat. 10° S., it is tolerably regular. Among the island of the Low Archipelago, especially from October or November to March, the easterly wind fails, and heavy squalls come from the opposite direction, and more frequently by night than by day. The natives say that their severe storms come from N.W. That the south-westerly gales of higher latitudes approach the archipelago, is shown by the heavy sea which frequently sets in on the lee side against the regular wind, making it most dangerous to land on those sides.

Captain Cook, at Tahiti, found fresh gales from S.W. for two or three days at a time, and sometimes, though seldom, from N.W. When variable they were always accompanied by a swell from S.W., which also came in when it was calm. The conclusion he arrived at was, that as the trade wind did not extend further south than lat. 20°, and beyond that he generally found a westerly gale blowing, this westerly wind, when it becomes stronger, will drive back the easterly wind, and encroach on its usual limits. At the Samoan Group these variations assume the character of the cyclone or revolving storm, and commit great devastation.

That the parallel of 20° is about the southern limit, is apparent at the Tonga Group. Here the trade wind is by no means constant, but westerly winds occasionally blow in every season. They are peculiarly prevalent during February, March, and April, often blowing for several days together. The heavy swell from S.W. is also almost continual. This season of variable winds is that of hurricanes, as is the case with the Samoan Group and Cook's Islands.

At the Fiji Group the trade wind prevails from April till November. From November till April northerly winds are often experienced. February and March heavy gales are frequent.

When the sun is in south declination, the northern edge of the trades advances to the southward.

Within the tropics, whenever large groups of islands are found, the trades are subject to great variation, both in direction and force.

THE WESTERN PART OF THE PACIFIC OCEAN.

This portion seems to have a different system of winds from those prevalent to the eastward, from the extension of the monsoons of the India and China seas.

The west monsoon blows steadily, strongly and regularly, along the north side of New Guinea, at New Britain, New Ireland, and all contiguous islands south of the Equator so far eastward as Malaya, and the northern part of the New Hebrides, and gradually decreasing in constancy and continuation, hence far eastward to the Society Islands and Marquesas. The limits in latitude appear similar to the Indian Ocean, from 1° N. to 15° S.; occasionally to 19° S.; the period from the beginning of January until the end of March.

The westerly monsoon in the Pacific, as in the Indian Ocean, is attended with cloudy, overcast weather, squalls and heavy rains. Some of these squalls are very severe, requiring all sail to be taken in when crossing the wind; even when running, close reefs will be found enough. Several experienced near New Ireland and New Guinea, which generally gave warning, and commenced at W.S.W., blowing furiously the first hour, and continuing in a strong gale, veering to north-west for five or six hours.

At the Solomon Archipelago it commences in December or January. In some years these months are tolerably fine. During February and March strong winds with severe squalls and heavy rains may be expected. April generally is a fine month, with variable winds. In May there is much fine weather. The south-east monsoon sets in strongly in June, with heavy rains and squalls, and continues so until the end of August. In all these months, nevertheless, there are considerable intervals of fine weather. In September the strength of the monsoon is spent, and the weather is moderate until the return of the north-wester.

Farther eastward, about the meridian of Rotumah, the westerly monsoon is less constant, beginning generally in January, and blowing strongly about seventeen or eighteen days consecutively, then declining; and the easterly wind returning in a fresh breeze for nearly the same period; the westerly wind again intervenes, usually commencing with a gale, and always continuing in a strong breeze, with squalls and rain; the easterly and westerly winds thus alternating until the end of March, when the south-east trade sets in steadily. Proceeding still farther eastward, the westerly monsoon gradually becomes less constant, and finally disappears about the meridian of the Marquesas.

From the early part of October to April the coast in the vicinity of Port Jackson is subject to tolerably regular sea and land breezes, the former from north-east, the latter from the westward. The sea breeze generally begins at 10 a.m., and subsides after sunset; the land wind about midnight, and continues until 8 a.m. The exceptions to this rule are north and south winds, which occasionally prevail, as do also the N.W. hot winds; these latter, after blowing from 12 to 72 hours, are usually succeeded by sudden violent gusts from S.S.E. to S.S.W., which generally settle into a gale from those quarters, accompanied with rain. The greatest vigilance is frequently insufficient to prepare for the suddenness with which these gusts overtake vessels.

From April to October, and between the equinoxes, the wind prevails strong, between north-west and south-west, with fine clear weather, and occasional gales from north or south, with rain.

Except during equinoctial gales, the wind rarely blows on shore with sufficient violence to endanger the safety of a well appointed vessel; but in the spring equinox, when these gales set in from south-east to east, accompanied with dense rain and a high barometer, they blow with great fury from 24 to 48 hours, and finish with a long slowly declining gale from south to south-west.*

Easterly gales, which appear to be regular in the number as well as the periods of their visits during the year, are the winds of all others most dreaded.

June, July, and sometimes August, are the months in which New South Wales is visited by them in their full violence. During these months, with the wind unsteady, cloudy unsettled weather and occasional rain, an easterly gale, lasting two or three days, may be looked for. They generally come with light winds from the northward, accompanied with rain sometimes lasting twenty-four hours, and an overcast, murky sky; settling at the N.E., they freshen gradually to a gale. The barometer is not in any way affected by their approach or continuance, standing steadily at from 30.12 to 30.18 throughout their duration.

On the South Coast of Australia similar weather and the same dangerous easterly gales may be looked for between Cape Howe and Wilson Promontory. The prevailing wind, however, on this coast, from the northward, both in summer and winter, generally commences early in the day, and after lasting two or three days suddenly terminates with a thunder storm from west or south-west, indicated by the fall of the barometer, which remains low until the storm is quite over, although there may be intervals of fine weather for two or three days. In the spring and autumn south-west or sea breezes are felt. Of the easterly gales Wilson Promontory appears to be the boundary, as they very seldom occur on the coast to the westward.

Westward of Cape Howe south-westerly breezes generally prevail during October, November, and December; in January, February, and March from the opposite direction. In the vicinity of Bass Strait N.E. winds blow during the hot summer

* *Storm Signals on the Coast of New South Wales.*—The existence of gales which are likely to endanger shipping will be signalled at the principal telegraph stations on the coast of New South Wales in the following manner, viz. :—

The signal masts will support two yards, which are to cross each other at right angles, in the direction of the cardinal points of the compass, the yard-arms denoting, respectively, North East, South and West; midway between North and East will indicate N.E., &c.

A violent squall will be represented by a conspicuous diamond-shaped signal.

A heavy sea will be represented by a drum-shaped signal.

Gale, with clear weather, will be represented by a diamond-shaped signal over a drum.

Gale, with thick weather and rain, will be represented by a diamond-shaped figure with a drum over it.

The direction from which a gale is blowing will be indicated by the particular yard-arm between which and the mast-head the geometrical signal is suspended.

Place where gale or squall is blowing will be shown by hoisting the numerical flags already in use at Sydney, Newcastle, and other coast stations.

Gales that are general over a large portion of the coast will be indicated by the geometrical figures, without the mast-head flags,

months, lasting four or five days, changing suddenly to the S.W. They are generally accompanied by a thick mist, but in the winter with a clearer sky. Westerly winds prevail for nine months of the year.

HURRICANES.

From lat. 10° S. to the southern tropic, hurricanes are likely to be experienced from November until April, more prevalent near the New Hebrides and New Caledonia than the Fiji group and Friendly Islands. In fact, the liability to hurricanes appear in exact ratio to that of the S.W. monsoon, or rather to the meridians in which the westerly monsoon blows, differing in latitude; the monsoon seldom extending beyond lat. 17° or 18° S; indeed, at times 13° S. is the limit, whereas hurricanes are experienced as far as the tropics, and more often and severely felt near the islands than well clear of the land. Years sometimes intervene without a ship encountering one. Near the Friendly Islands (and perhaps elsewhere) storms occasionally happen of extreme violence, blowing from one point, and producing similar effects to hurricanes. In November, 1835, eight or ten ships, English and American, encountered one of these near Tonga-tabu and Eoa, from S.S.E., the heavy part of which lasted about eight hours, causing more or less damage to all; one or two were dismantled. It did great damage at Tonga-tabu, and was felt very severely at the Hapai Islands and Vavao. Still farther north the Nassau encountered it in 16° N., in the shape of a heavy gale. At all these places the wind was from the southward, S.S.E. by the ships.

In the tropical regions of the South Pacific, from the equator to 23° S., there is no doubt that true hurricane storms (cyclones) occur of a great violence at least as those in the North Pacific; they appear to come from the eastward amongst the islands, and to curve to the Southward and S.E. The following are a few notes. The seasons at which they prevail seem also to be the same as those of the Mauritius and Bourbon.

At Viti-Levu (Fiji Group) in February, 1841, a well-defined circular storm (cyclone) tolerably observed, seems to have moved to the southward, and, though it lasted four days, was not felt at Tonga, 8° or 10° to the S.E. of it.

At Apla Harbour (Navigators' Islands), 14° S., December, 1840, a true hurricane storm (cyclone) of great violence, with a fall of four inches of the mercury (by a damaged barometer) was observed, moving from the north, southward; four years previous another, also well defined, moving from N.E., south-eastward, the change of wind being from S.E. to N.W. The space between the Samoan (Navigators') Islands is said expressly to be subject to violent hurricanes, and that scarcely a year passes without some of the Friendly Islands suffering from them.*

At the Kingsmill Group, on the equator, violent storms, which appear to be typhoon-like, are experienced.

At New Zealand there is no doubt that true rotary hurricanes (cyclones) sometimes occur, and of considerable violence. In the U.S. Exploring Expedition, vol. ii., p. 381, is a very good account of one which occurred February, 29, 1840, at the Bay of Islands, said to have been the severest which the missionaries had experienced there. It was felt at other stations, with all the veerings, calm centre, etc., of a true tropical hurricane (cyclone), its course being to the south-westward.†

Tempestuous weather is equally common in the latitudes of 20° and 23° in the South Sea, as in the oceans of Europe. Along the coasts and adjacent seas the winter begins in the month of June, and lasts till October or November, its greatest violence being past in August or September.

The following concise account of two hurricanes is supplied by Capt. J. Mackay. It is to be regretted that more of the same sort is not available:—

* HURRICANE OF 21ST DECEMBER, 1879.—The captains of the mission vessel Jubilee and of the cutter Thistle state that it was felt in the neighbourhood of Vassil Island a day before it reached Fiji. The first winds were felt from east, shifting to north-east and north, giving a south-westerly direction for its track. The barometer fell to about 28°80. On the following day it was felt at the Yasawa Group, and on the west side of Viti Levu, accompanied by a tidal wave, but was not felt on Vanua Levu. At Yasawa it began at E.N.E., ending in the north-west quarter. At Suva, on the south side of Viti Levu, the heaviest blow was from the westward. At Kandavu it was not felt; but at Ono, northward, it was felt slightly. The island of Matuku was devastated by it, but the central islands of the group were not touched. By this it appears that the radius of the storm was exceedingly limited, that it came from the northward and eastward, and that it recurved at the south-west extreme of the Fiji Group, passing over the south-west part of Viti Levu.

† HURRICANE IN NEW HERBIDES, END OF FEBRUARY, 1877.—Capt. Mackay was at anchor in the Daphne inside the Maskelyne Island, off the south part of Malicollo. At 8 a.m., barometer 29.70, wind east, blowing hard, with rain and squalls; 10 a.m. wind E.N.E., bar. falling; noon, wind north-east, barometer falling; 2 p.m., wind north, increasing, barometer falling; 3 p.m., wind north-west, barometer stationary (minimum) 29.10. Wind uniform strength, two anchors down, all gear from aloft on deck, topmasts housed. Sixty miles to the N.W., at Malo, in Boagnoille Strait, at 8 a.m., the Dauntless had the wind at west, blowing very hard; topmasts housed, etc. It blew very hard for an hour or two and then died away (she was evidently just on the northern limit). At Lepers Island, about 60 miles north-eastward of the Dauntless, the Pacific, at 11 a.m. had the wind about north, veering westward; had to cut away masts. At 2 p.m., as the wind left him. At Havannah Harbour it was

* "Tonga is within the cycle of hurricanes, but the violence of their visitation has ceased," —as reported from a lecture by Rev. S. Baker, Auckland, 29th October, 1880.

† It is said to have passed between the Bay of Islands and the River Thames at the rate of about 340 miles in thirty six hours, or say, ten miles an hour. Commodore Wilkes suggests that this may have been the same as that which occurred at the Fiji Group, which is very probable.

felt more slightly from E.N.E., north-about to N.W. This storm also appears to have been of very limited extent, and to have re-curved to the south-ward and east-ward, about the position of the Daphne, which was nearly in the same parallel as the one at Fiji; and in both cases re-curling round to the different Groups."

NOTES OF A HURRICANE EXPERIENCED IN FIJI IN JANUARY, 1875, by Captain Cox (now Harbour Master at Levuka), have been kindly forwarded by him, from which the following is compiled, viz.:—"From the 1st to the 4th January, winds westerly and northerly, barometer steady at 29.90 to 29.80. January 6th left Rotumah for Fiji, a heavy N.W. swell, wind northerly, barometer 29.85 to 29.75 (beginning to fall); January 6th, wind north, barometer fell to 29.55; January 7th (hurricane), 8 a.m., wind N. by E., barometer 29.50; at 10 a.m., wind N.N.E., barometer 29.43; anchored at Waia (Yasawa Group) in 12 fathoms, two anchors with 65 fathoms of chain, and one anchor with 75 fathoms of 6-inch hawser and an extra warp: noon, barometer 29.26; 1 p.m., wind N. to N.N.E., barometer 29.20; 4 p.m., wind N.N.E., barometer 29.0; 5.30 p.m., wind N.N.E., barometer 28.78; 6 p.m., wind N.N.E., barometer 28.63; 6.45 p.m., wind N.N.E., barometer 28.57; 7 p.m., wind changed to south, barometer at its minimum 28.55 and vibrating; 7.30 p.m., wind S.W.; 8 p.m. wind S.W. by W., barometer 28.70, blowing a hurricane, had to go about the deck on all fours, got ends of chains on deck in case of drifting on to shore reef; 9 p.m., wind S.W. by W., fearful gale, barometer 28.90; midnight, S.W. strong gale, barometer 29.10. From this time it gradually moderated, the wind continuing at S.W., the barometer rising until on the morning of the 10th, when the weather was fine and clear, the bar. steady at 29.95, and the vessel resumed her voyage. By the above it appears as if this storm had from the steadiness of the wind at N.N.E. advanced on Waia from the W.N.W. but that from the change in the wind its centre must have passed a little southward, and on to the south-east by the the southern part of Viti Levu, much as the one described by Captain Mackay."

By these two accounts it looks as if the south-west extreme of Fiji lies in the south-western bend of the re-curve.

A FEW SHORT DIRECTIONS NOW FOLLOW.—It is usually considered that the centre of the storm bears eight points from the direction of the wind, and Dove's tables and the usual directions are given for this; but the latest investigations show that in certain positions the centre may be 10 or even 12 points from the direction of the wind. Captain Bedford, in his valuable "Hand Book," says, "At a considerable distance from the centre, and before the barometer has fallen much, the centre may be as much as 12 points from the direction of the wind." And remarks: "Every strong wind or gale met with must not be treated as a cyclone; the barometer must in these cases be closely watched, and a decided fall of at least half an inch be experienced from the normal average, before arriving at the conclusion that the vessel is within the influence of a cyclone. In this case the safe proceeding is to *heave-to*, and carefully watch for the *shifting* of the wind, and the marked *changes* of the barometer; when the position of centre and probable direction of path can be determined with some precision, a decided fall of the barometer should take place before the centre is assumed to bear eight points from the direction of the wind. The rule (Southern Hemisphere) then is, first, to face the wind and take the eighth point to the *left* for the bearing of centre; next, to discover on which side of the storm's path the vessel is; if on the right hand side (looking in the direction towards which the storm is advancing) the wind will veer S., S.W., W., N.W., or with the hands of a watch; while if she is on the left hand side the wind will change S., S.E., E., N.E., or against the hands of a watch. The advisability of heaving a vessel to on the first approach of a storm cannot be too strongly urged. Although a cyclone may be made use of by the experienced seaman when making a passage, and where sea room will admit, a vessel may be frequently able to run out of the direct influence of the coming storm. Yet, as a general rule, it is advisable to *heave-to* on the tack on which she will come up as the wind shifts; therefore on the *right hand* semicircle, *heave-to* on *starboard tack*; and if on *left hand* semicircle, on the *port tack*. (Reid's rule was: *Heave-to* on starboard tack in Northern Hemisphere, and port tack in the Southern. *Run* with wind on starboard quarter in Northern, and on port quarter in Southern Hemisphere). If, with the ship *hove-to*, the wind continues steady in direction and increasing in violence with a rapidly falling barometer, it may be presumed that the ship is in the direct path of the storm's centre, and it will be necessary to run before the wind. If unable, for want of room, to do this, her position becomes one of great danger, and every precaution should be taken for the passage of the centre over the ship. In all cases within the tropics they commence to the east, and travel west, including a point or two towards the Pole, and as they advance to curve away more from the Equator till they move to the S.E. (in South Hemisphere). Storm Wave.—The long rolling swell generally precedes the storm's path (see account of 3rd Hurricane above), and thus indicates its approach many hours, if not a day before it is encountered. Another point remains to be noticed—the surface current in a hurricane has been known to drift a ship ten miles an hour, and for nearly two days a ship has been drifted at the rate of five miles an hour."

In an article in the 'Nautical Magazine' for September, 1880, on "The Heaving-to Tack," the writer (J. K. Laughton), says: "All this may be shortly stated thus: On the right hand side the wind shifts to the right, and you should lie-to on starboard tack; on the left hand side the wind shifts to the left, and you should lie-to on port tack. Or still more shortly: Right, right, starboard; Left, left, port." This short rule can be easily remembered.

In conclusion a short rhyme (as in the case of the rule of the road) may be found useful, viz.:

For *centre*, first, the wind you face;
Eight points to *left* shows centre's place.

And next, when on storm's *right hand* track,
The wind is always found to *back*.
Then to storm's *left*, it's very clear,
The wind is always bound to *veer*.

And finally it may be stated that in the Southern Hemisphere the wind blows round the centre, *with the hands of a watch*; in the Northern Hemisphere the reverse; and that in both Hemispheres the wind is always *West* on the side nearest the Equator.

THE CURRENTS OF THE SOUTH PACIFIC OCEAN.

Next to a knowledge of the prevailing winds, that of the currents is the most important to the navigator. By the combined action of these two phenomena, and their effects are frequently coincident, a passage may be made in a much shorter period, though by a circuitous route.

Currents have been distinguished as of two classes—the drift current and the stream current.

The drift current is the mere effect of a constant or very prevalent wind on the surface water, impelling it to leeward until it meets with some obstacle which stops it, and occasions an accumulation, and consequently stream of current.

The stream current is thus formed by the accumulated waters of a drift current. It is more limited, but it may be of any bulk, depth, or velocity.

There is much greater uncertainty in ascertaining the rate of currents by the means ordinarily employed than is usually considered. It is pretty certain that much error of dead reckoning, now attributed to current, would be properly placed to other accounts. Without great care in the navigating, an exact estimate of their rate and direction cannot be made. Bad steering, the heave of the sea, imperfection in the log or glass, uncertainty of the leeway, all tend to invalidate the estimate formed.

The imperfection of observations for longitude, the errors in the rates of chronometers not ascertained but at long intervals, all tend to throw discredit on allowances for current.

There is one source of error which, until recent times, has passed unregarded by most—the local attraction of a ship on her compass.

The current streams of the Pacific are not generally so strongly marked as they are in the Atlantic.

The surface drifts may not be very deep, but may overlay a more powerful current moving in a very different direction; and therefore the surface motion may not give any just notion of its real nature.

Violent winds have the effect of disturbing the strata, the lower and cooler portions rising to the surface, occasioning veins of differing temperatures. This becomes more manifest when the storm waves reach a shelving coast, and the deeper lying portions become thus lifted to the surface.

A shoal may have cooler water over it from the fact of the lower strata of a current being diverted *upward* by its shelving sides, particularly after any great disturbance of the surface. In the Pacific, therefore, little dependence can be placed on the thermometer as a safeguard or warning of approach to shoals,

THE EQUATORIAL CURRENTS.

Captain Duperrey, who has devoted much labour to the elucidation of the currents, places the southern limit of the equatorial current, beyond the influence of the continent, at lat. 26° S., and its northern border at lat. 24° N., or (partially) occupying a zone of 50° in breadth. It is more than probable that these latitudes may vary at the different seasons.

In the southern part of the Low Archipelago, Captain Beechey found it running strongly to the south.

Beyond the Fiji Islands to the westward, a S.W. current prevails (Wilkes).

Between the Society and Navigator's Islands Wilkes considered that no current exists. The distance is about 2,000 miles, and in his passage, which occupied fourteen days, his drift only amounted to 43 miles, in a N. 9° W. direction.

Around the Samoan Group a current appeared to revolve: for on its southern side it set continually eastward, while on its northern side it set to the west. The current is weaker near the shores, and is not fully developed until at some distance from the islands. A knowledge of its existence is of importance to the navigator, as advantage may be taken of the easterly direction of that part south of the islands in beating to windward.

After leaving the Fiji Group Wilkes did not experience any current until he reached 8° South. He then experienced currents for three or four days, which amounted to no more than 20 or 30 miles in a S. by W. direction.

Approaching the western end of this southern equatorial current, that is, to the west of the Fiji Archipelago, we find that the currents vary considerably in their direction, and are frequently very violent.

A portion of this has been called Rossell's Drift, to the N.W., off the New Hebrides, New Caledonia, etc. But it can scarcely deserve the name of a permanent current.

On the eastern side of the reefs extending to the N.W. of New Caledonia, D'Urville found the current setting to the N.N.W., 34 miles a day, in June, 1827.

"Southward of New Georgia and Bougainville Islands, throughout the S.E.

monsoon, from May until October, in 1836 and 1840, the current ran strongly to the S.E. against a strong wind and heavy swell, although at the same time on the north side of these islands, it was running strongly to the westward. Off the north side of New Ireland, where a westerly current prevails, changes to the eastward occur for ten or twelve days at all seasons."—Nautical Magazine, 1842.

Between September and March westerly winds are regular at the Solomon Islands, and, according to M. Dutailis, after they have set in, a very strong current runs invariably to the E.N.E. or N.N.E. between them and Santa Cruz, etc., sometimes forty miles per day.

Captain LeMignon found the current, in April, 1846, between Mitre Island and San Christoval to run at the rate of 24 or 25 miles a day to the east. South of the Solomon Islands they ran to the South 45 miles a day, and also 30 to 45 miles to the east. The weather, it should be stated, was very bad, and the winds violent and irregular.

Between the Fiji Islands and the New Hebrides D'Urville found the current setting to the west 40 miles per day throughout his passage.

Between New Zealand and Tonga Wilkes found the currents variable; their general effect was a drift of 108 miles, in a direction S. 83° W. On this route he passed the Kermadec Islands.

THE EQUATORIAL COUNTER CURRENT.

In the current systems we find a body of water moving with more or less regularity to the eastward, bounded to the north and south by currents moving in the opposite direction. This counter current has been traced, with considerable certainty, nearly across the entire breadth of the Pacific. Capt. Lutke remarks:—

Between 10° and 2° S., for four days, during which the trade wind was constant and equal, a tolerably strong westerly current set to the W. by N., seventeen miles in twenty-four hours.

In 2° S., the trade wind was lost, and the current shifted also to the East, then to N.E., and again to S.E., but more to this last quarter as far as 8° or 10° north latitude, where the N.E. trade stopped it. Its mean effect was E. 6° S. 12½ miles in 24 hours.

In approaching the Island of Ualan we found a S.E. current in lat. 8°, and long. 163° E. West of this meridian the easterly current did not extend toward the North beyond the parallel of 7°, and toward the South in general beyond that of 5½°. Between these parallels, and as far as 152° E., in the course of more than three weeks (in January), we did not once have westerly currents, but always to the East, inclining to the South in the eastern and more to the North in the western half. Its mean effect, during these three weeks, was 8.3 miles in the twenty-four hours to the E. by N.

We had no sooner passed to the north of 6½° N. 152° E., than we got into a strong current to the west, which did not leave us afterwards. Captain Duperrey, between lat. 2° and 6° N., and 7° to 10° E. of Ualan, had currents to the S.E. and N.E., but, on approaching this last island, they were still more to the S.W.; again, between the equator and 8½° N., and long. 148° E. and 137° E. he again found them easterly. To the north of this eastern current, within the limits of these easterly winds we always found a constant current to the west, inclining in some parts towards the north, in others to the south.

Captain Wilkes says:—"On our route to the northward we crossed a stream setting to the westward, which extends as far west as the Kingsmill Group, between lat. 2° S. and 3° N., after leaving which we encountered another, setting with equal velocity to the east, between lat. 4° and 9° N. This last tropical counter current was traced by us between the same parallels nearly across the Pacific, from the long. of 170° E. to the long. of 138° W."

At the Gilbert Archipelago, during the violent gales from S.W., which prevail from October to April, trunks of large trees are thrown upon the west sides of the islands, together with large lumps of resin, similar to that found in the soil of New Zealand.

These observations will demonstrate that between 4° and 10° N., which limits may be subject to some fluctuation, there is a current running to the eastward, or against the usual course of the inter-tropical winds and the drift of the ocean on either side of it.

THE AUSTRALIAN CURRENT.

The southern edge of the south equatorial stream, striking the coasts of New Caledonia, the New Hebrides, &c., trends away to the N.W.; so, in like manner, the portion South of this reaching the Australian coast, is deflected and runs to the southward, a warm stream, off the coast of Australia. This course it pursues until it encounters the cold antarctic drift to the north-east, which thus again deflects it and becomes incorporated with it. The following remarks are from Admiral Krusenstern's treatise:—

Although the winds blow throughout the year either from south-east or south-west, the current constantly runs to the south, with the velocity of one or two miles an hour, at the distance of from four to twenty leagues from land. Beyond these limits there is no current found, and very close to the land, particularly in the bays, we have a current to the north, but which does not exceed a quarter, or at most a mile, an hour. At the south-east and southern part of Australia the current is very violent, and bears to the south, and near Cape Howe its direction draws more towards the east. In ranging along this part of the coast to go southward it will be well to keep at the distance of 40 or 50 miles from land so as not to fear the gales from seaward which will be met with in the course of the current which runs to the south. On the contrary, if a vessel is making way for the north, she ought not

to leave the coast more than 10 miles; but this navigation demands much caution, to guard against gales from seaward. The barometer will then be the best guide; it rises on this part of the coast with south-east winds, and falls with those from north-west; north-east or south-west winds do not equally influence the barometer.

According to Lieut. Jeffries, the currents from 28° to the southern part of Van Diemen's Land, during summer, that is, from August or September until April or May, run south by west with a rate of 1½ miles; always provided that the distance from the coast does not exceed seven leagues; if it is greater than this and as far as 20 leagues off, they run to north by west, with a rate of 3½ miles an hour. In winter the opposite of what has just been stated takes place. This belt does not exceed 300 miles in breadth; beyond, or to the east of which, the current sets to the northward 10 miles per day.

Captain Wilkes, in his remarks on the currents, also has the following:—Before making the coast of New South Wales, the temperature of the water rose to 73°, and on a subsequent occasion to 75°, and we experienced a stream that sets southward parallel to the coast of New South Wales. This current, like the Gulf Stream, is variable in breadth and strength, and at certain seasons of the year runs with great rapidity. The occurrence of this stream renders it advisable that vessels bound to Sydney should make their landfall northward of the harbour. There is no difficulty in tracing the connection of this stream with that which we found setting to the south-west near the Fiji Group. This stream is analogous to our Gulf Stream, although much less remarkable, and is at times found to extend south of Tasmania, the distance to which it prevails depending on the strength of the polar current which opposes it. It more frequently turns into Bass's Straits, after which it is lost in the sea to the west of Tasmania, or mingles with the polar current.

In the space between Australia and New Zealand; to the westward is the southerly warm current just described. To the south this warm current is pressed upward by the northerly cold antarctic current. On the New Zealand coast this current is felt as far northward as Cook Strait, while to the northward of the islands the warm equatorial and the cool polar currents by turns gain ascendancy. This system develops one feature, that of a central space in which no current (except those dependent on the wind) is to be found. It is called by the whalers the *middle ground*, and has been exceedingly productive to the New Zealand and Australian whale fishery.

The following may be given here respecting the currents around New Zealand:—Wilkes considered that the antarctic drift strikes the southern part of the islands, and forms currents on either side of the range, which, however, are not constant. That branch which flows on the western side appeared to be strongest, and it is felt as far north as Cook Strait. The current which flows on the eastern side forms an eddy to the north of the islands.

PASSAGES.

The following account of passages between Auckland and Fiji (kindly furnished by Captain J. Mackay) may prove useful:—

“Of 18 consecutive voyages, seven were made leaving the coast of New Zealand with N.E. winds, which veered eastward as nothing was made, finally settling at from E.S.E. to E.N.E.; fresh breeze and occasional rain squalls, and carried to Fiji.

“Six were made leaving New Zealand coast with strong S.E. winds, veering to east and north; when north-east, the sky becomes overcast and wind light; when north, heavy rain, and shifts in a few hours to north-west in a heavy squall, immediately followed by clear weather, and, invariably a fresh breeze. This shift was generally between the parallels of 25° and 30° S.

“Three voyages were made leaving the New Zealand coast with strong westerly winds, which, as nothing was made, backed into N.N.W., blowing steadily from that direction for some days; when 28° or 26° S. is attained it generally goes back south. This peculiar deflection from the usual rotary movement is prevalent from March till July, or when strong westerly winds prevail on this coast.

“Two trips were made with strong S.E. winds on leaving New Zealand, carrying them right through to Fiji; but this is the exception.

“The above applies throughout the year, and is not confined to any particular season, further than that during the winter months of 1879, strong westerly winds prevailed within about 300 miles of the coast, and that during this year, 1880, they were extremely rare; the prevailing winds being E.S.E. to E.N.E. The above passages have been made between the meridians of 176° E. and 180°, and averaged slightly under eight days each.”

ADDENDUM.

Captain Fairchild says:—“Bull Rock, near Portland Island (New Zealand), dries one foot at low water. The chart shows eight feet on it. The next rock inside the Bull Rock dries two feet at low water, the chart showing six on it.”

APPENDIX.

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NAUTICAL ALMANAC

FOR

1881, 1882, 1883.

1891

NAUTICAL ALMANAC

1891, 1892, 1893

JANUARY, 1881.

Day of the Week.	Day of the Month.	AT APPARENT NOON THE SUN'S				Equation of Time to be added to Apparent Time.		Var. in One Hour.	Semi-diameter.	THE MOON'S Meridian Passage.
		Apparent Declination.	Var. in hour.	m	s	s	'				"	h	m
Sat.	1	S 22 58 27.7	12.95	3 59.45	1.180	16 18.2	1 0.6			
Sun.	2	22 53 3.1	14.09	4 27.61	1.165	16 18.2	1 59.2			
Mon.	3	22 47 11.2	15.23	4 55.38	1.148	16 18.2	2 53.6			
Tues.	4	22 40 52.2	16.35	5 22.73	1.130	16 18.2	3 44.4			
Wed.	5	22 34 6.3	17.47	5 49.64	1.111	16 18.1	4 32.3			
Thur.	6	22 26 53.6	18.58	6 16.06	1.090	16 18.1	5 19.8			
Frid.	7	22 19 14.4	19.68	6 41.98	1.069	16 18.1	6 6.5			
Sat.	8	22 11 9.0	20.77	7 7.37	1.046	16 18.1	6 53.6			
Sun.	9	22 2 37.5	21.85	7 32.21	1.023	16 18.0	7 41.5			
Mon.	10	21 53 40.2	22.92	7 56.47	0.998	16 18.0	8 30.1			
Tues.	11	21 44 17.4	23.98	8 20.13	0.973	16 18.0	9 19.9			
Wed.	12	21 34 29.3	25.02	8 43.17	0.947	16 17.9	10 9.5			
Thur.	13	21 24 16.3	26.06	9 5.58	0.920	16 17.8	10 58.3			
Frid.	14	21 13 38.5	27.08	9 27.34	0.892	16 17.8	11 45.8			
Sat.	15	21 2 36.4	28.09	9 48.42	0.861	16 17.7	12 31.7			
Sun.	16	20 51 10.1	29.09	10 8.82	0.835	16 17.6	13 15.9			
Mon.	17	20 39 20.1	30.07	10 28.51	0.806	16 17.6	13 58.9			
Tues.	18	20 27 6.6	31.05	10 47.49	0.776	16 17.5	14 41.2			
Wed.	19	20 14 29.8	32.01	11 5.75	0.745	16 17.4	15 23.7			
Thur.	20	20 1 30.3	32.95	11 23.27	0.714	16 17.3	16 7.3			
Frid.	21	19 48 8.2	33.88	11 40.04	0.683	16 17.2	16 52.9			
Sat.	22	19 34 23.9	34.80	11 56.07	0.652	16 17.1	17 41.7			
Sun.	23	19 20 17.8	35.70	12 11.33	0.620	16 16.9	18 34.5			
Mon.	24	19 5 50.2	36.59	12 25.83	0.588	16 16.8	19 31.6			
Tues.	25	18 51 1.6	37.46	12 39.55	0.555	16 16.7	20 32.5			
Wed.	26	18 35 52.3	38.31	12 52.49	0.523	16 16.6	21 35.5			
Thur.	27	18 20 22.6	39.15	13 4.64	0.489	16 16.4	22 38.3			
Frid.	28	18 4 33.1	39.97	13 15.98	0.456	16 16.3	23 38.9			
Sat.	29	17 48 24.2	40.77	13 26.52	0.422	16 16.2	* * *			
Sun.	30	17 31 56.2	41.55	13 36.23	0.387	16 16.0	0 36.2			
Mon.	31	17 15 9.6	42.32	13 45.11	0.353	16 15.9	1 30.2			

PHASES OF THE MOON.

h	m	h	m
20	9.0	15	16
23	33.8	15	16
20	47.4	15	16
12	48.0	15	16
January 6	First Quarter	January 13	Apogee
14	Full Moon	23	Perigee
22	Last Quarter		
29	New Moon		

FEBRUARY, 1881.

Day of the Week.	Day of the Month.	AT APPARENT NOON THE SUN'S				Equation of Time to be added to Apparent Time.		Var. in One Hour.	Semi-diameter.	THE MOON'S Meridian Passage.
		Apparent Declination.	Var. in hour.	m	s	s	'				"	h	m
Tues.	1	S 16 58 4.9	43.06	13 53.16	0.318	16 15.7	2 21.4			
Wed.	2	16 40 42.5	43.80	14 0.38	0.283	16 15.6	3 10.8			
Thur.	3	16 23 2.7	44.51	14 6.76	0.248	16 15.4	3 59.2			
Frid.	4	16 5 6.0	45.21	14 12.30	0.214	16 15.3	4 47.6			
Sat.	5	15 46 52.7	45.89	14 17.02	0.179	16 15.1	5 36.4			
Sun.	6	15 28 23.4	46.55	14 20.91	0.145	16 15.0	6 25.7			
Mon.	7	15 9 38.4	47.19	14 23.98	0.111	16 14.8	7 15.4			
Tues.	8	14 50 38.2	47.82	14 26.24	0.077	16 14.6	8 5.0			
Wed.	9	14 31 23.2	48.43	14 27.70	0.044	16 14.5	8 54.1			
Thur.	10	14 11 53.7	49.02	14 28.35	0.011	16 14.3	9 42.0			
Frid.	11	13 52 10.1	49.60	14 28.22	0.022	16 14.1	10 28.5			
Sat.	12	13 32 13.0	50.16	14 27.31	0.054	16 13.9	11 13.4			
Sun.	13	13 12 2.6	50.70	14 25.65	0.085	16 13.7	11 57.1			
Mon.	14	12 51 39.4	51.23	14 23.23	0.116	16 13.5	12 40.1			
Tues.	15	12 31 3.8	51.74	14 20.08	0.146	16 13.3	13 23.0			
Wed.	16	12 10 16.1	52.23	14 16.21	0.176	16 13.1	14 6.6			
Thur.	17	11 49 16.8	52.71	14 11.64	0.205	16 12.9	14 51.7			
Frid.	18	11 28 6.2	53.17	14 6.38	0.233	16 12.7	15 39.2			
Sat.	19	11 6 44.7	53.61	14 0.46	0.260	16 12.4	16 29.9			
Sun.	20	10 45 12.7	54.04	13 53.88	0.287	16 12.2	17 24.2			
Mon.	21	10 23 30.6	54.45	13 46.68	0.313	16 12.0	18 21.8			
Tues.	22	10 1 38.9	54.85	13 38.86	0.338	16 11.8	19 21.7			
Wed.	23	9 39 37.9	55.23	13 30.44	0.363	16 11.5	20 22.3			
Thur.	24	9 17 28.1	55.59	13 21.44	0.387	16 11.3	21 21.9			
Frid.	25	8 55 9.8	55.93	13 11.86	0.411	16 11.0	22 19.3			
Sat.	26	8 32 43.6	56.25	13 1.72	0.434	16 10.8	23 14.1			
Sun.	27	8 10 9.8	56.56	12 51.03	0.456	16 10.6	* * *			
Mon.	28	7 47 28.9	56.84	12 39.81	0.478	16 10.3	0 6.5			

PHASES OF THE MOON.

h	m	h	m
12	54.0	0	0
18	23.6	0	0
7	29.9	0	0
23	32.3	0	0
February 5	First Quarter	February 10	Apogee
13	Full Moon	25	Perigee
21	Last Quarter		
27	New Moon		

MARCH, 1881.

Day of the Week.	Day of the Month.	AT APPARENT NOON. THE SUN'S				Equation of Time to be added to		Semi-diameter.	THE MOON'S Meridian Passage.
		Apparent Declination.		Var- in hour.	subt. from Apparent Time.				
		°	'		m	s			
Tues.	1	S 7	24 41'3"	57'11"	12	28'07"	0'500	16 10'1"	h m
Wed.	2	7	1 47'5"	57'36"	12	15'82"	0'521	16 9'8"	8 9'0"
Thur.	3	6	38 47'8"	57'60"	12	3'08"	0'541	16 9'6"	10 26'7"
Frid.	4	6	15 42'6"	57'82"	11	49'87"	0'560	16 9'4"	15 23'4"
Sat.	5	5	52 32'3"	58'02"	11	36'21"	0'579	16 9'1"	10 32'1"
Sun.	6	5	29 17'4"	58'21"	11	22'10"	0'597	16 8'9"	
Mon.	7	5	5 58'2"	58'39"	11	7'57"	0'614	16 8'6"	
Tues.	8	4	42 35'1"	58'54"	10	52'64"	0'630	16 8'3"	
Wed.	9	4	19 8'5"	58'68"	10	37'33"	0'646	16 8'1"	
Thur.	10	3	55 38'7"	58'80"	10	21'65"	0'660	16 7'8"	
Frid.	11	3	32 6'2"	58'90"	10	5'64"	0'674	16 7'6"	
Sat.	12	3	8 31'3"	59'00"	9	49'30"	0'687	16 7'3"	
Sun.	13	2	44 54'3"	59'08"	9	32'66"	0'699	16 7'1"	
Mon.	14	2	21 15'7"	59'14"	9	15'74"	0'710	16 6'8"	
Tues.	15	1	57 35'7"	59'19"	8	58'57"	0'720	16 6'5"	
Wed.	16	1	33 54'7"	59'23"	8	41'18"	0'729	16 6'3"	
Thur.	17	1	10 13'0"	59'25"	8	23'58"	0'737	16 6'0"	
Frid.	18	0	46 31'0"	59'25"	8	5'80"	0'744	16 5'7"	
Sat.	19	S 0	22 49'0"	59'25"	7	47'86"	0'750	16 5'4"	
Sun.	20	N 0	0 52'7"	59'23"	7	29'80"	0'755	16 5'2"	
Mon.	21	N 0	24 33'7"	59'19"	7	11'64"	0'759	16 4'9"	
Tues.	22	0	48 13'6"	59'13"	6	53'39"	0'762	16 4'6"	
Wed.	23	1	11 52'1"	59'07"	6	35'07"	0'764	16 4'3"	
Thur.	24	1	35 28'9"	58'99"	6	16'72"	0'765	16 4'0"	
Frid.	25	1	59 3'5"	58'89"	5	58'34"	0'766	16 3'7"	
Sat.	26	2	22 35'5"	58'78"	5	39'95"	0'766	16 3'5"	
Sun.	27	2	46 4'7"	58'65"	5	21'58"	0'765	16 3'2"	
Mon.	28	3	9 30'6"	58'50"	5	3'23"	0'764	16 2'9"	
Tues.	29	3	32 52'8"	58'34"	4	44'92"	0'761	16 2'6"	
Wed.	30	3	56 10'9"	58'16"	4	26'68"	0'759	16 2'3"	
Thur.	31	4	19 24'6"	57'97"	4	8'51"	0'755	16 2'1"	

PHASES OF THE MOON.

March 7	First Quarter	h 8	m 20
March 15	Full Moon	8	26'7"
March 22	Last Quarter	15	23'4"
March 29	New Moon	10	32'1"
March 9	Apogee	h 18	m 11
March 25	Perigee	11	18

APRIL, 1881.

Day of the Week.	Day of the Month.	AT APPARENT NOON. THE SUN'S				Equation of Time to be added to		Semi-diameter.	THE MOON'S Meridian Passage.
		Apparent Declination.		Var- in hour.	subt. from Apparent Time.				
		°	'		m	s			
Frid.	1	N 4	42 33'6"	57'77"	3	50'44"	0'751	16 1'8"	2 6'0"
Sat.	2	5	5 37'5"	57'55"	3	32'47"	0'746	16 1'5"	2 57'4"
Sun.	3	5	28 35'9"	57'31"	3	14'63"	0'740	16 1'3"	3 48'8"
Mon.	4	5	51 28'5"	57'06"	2	56'93"	0'734	16 1'0"	4 39'6"
Tues.	5	6	14 14'9"	56'80"	2	39'39"	0'727	16 0'7"	5 29'0"
Wed.	6	6	36 54'7"	56'52"	2	22'03"	0'719	16 0'4"	6 16'6"
Thur.	7	6	59 27'7"	56'23"	2	4'86"	0'711	16 0'2"	7 2'5"
Frid.	8	7	21 53'5"	55'92"	1	47'89"	0'702	15 59'9"	7 46'9"
Sat.	9	7	44 11'7"	55'50"	1	31'15"	0'692	15 59'6"	8 30'3"
Sun.	10	8	6 22'1"	55'26"	1	14'65"	0'682	15 59'4"	9 13'4"
Mon.	11	8	28 24'3"	54'91"	0	58'42"	0'670	15 59'1"	9 57'0"
Tues.	12	8	50 18'0"	54'55"	0	42'47"	0'658	15 58'8"	10 42'0"
Wed.	13	9	12 2'8"	54'18"	0	26'83"	0'645	15 58'6"	11 29'3"
Thur.	14	9	33 38'5"	53'79"	0	11'51"	0'631	15 58'3"	12 19'6"
Frid.	15	9	55 4'8"	53'39"	0	3'47"	0'617	15 58'0"	13 13'4"
Sat.	16	10	16 21'3"	52'98"	0	18'09"	0'601	15 57'8"	14 10'4"
Sun.	17	10	37 27'7"	52'55"	0	32'32"	0'584	15 57'5"	15 9'8"
Mon.	18	10	58 23'8"	52'11"	0	46'14"	0'567	15 57'2"	16 9'7"
Tues.	19	11	19 9'2"	51'66"	0	59'55"	0'550	15 57'0"	17 8'6"
Wed.	20	11	39 43'5"	51'19"	1	12'53"	0'531	15 56'7"	18 5'2"
Thur.	21	12	0 6'5"	50'71"	1	25'05"	0'512	15 56'4"	18 58'9"
Frid.	22	12	20 17'7"	50'22"	1	37'12"	0'493	15 56'2"	19 50'2"
Sat.	23	12	40 16'9"	49'71"	1	48'72"	0'473	15 55'9"	20 39'6"
Sun.	24	13	0 3'7"	49'18"	1	59'83"	0'453	15 55'7"	21 28'1"
Mon.	25	13	19 37'7"	48'64"	2	10'45"	0'432	15 55'4"	22 16'6"
Tues.	26	13	38 58'6"	48'09"	2	20'56"	0'411	15 55'1"	23 5'8"
Wed.	27	13	58 6'1"	47'52"	2	30'17"	0'390	15 54'9"	23 55'9"
Thur.	28	14	16 59'8"	46'94"	2	39'27"	0'368	15 54'7"	*
Frid.	29	14	35 39'4"	46'34"	2	47'85"	0'346	15 54'4"	0 47'1"
Sat.	30	14	54 4'6"	45'74"	2	55'90"	0'324	15 54'2"	1 38'8"

PHASES OF THE MOON.

April 6	First Quarter	h 3	m 54'4"
April 13	Full Moon	23	49'7"
April 20	Last Quarter	21	37'8"
April 27	New Moon	22	24'4"
April 6	Apogee	h 14	m 12
April 19	Perigee	12	12

MAY, 1881.

Day of the Week.	Day of the Month.	AT APPARENT NOON THE SUN'S		Equation of Time to be subtr. from	added to Apparent Time.	Var. in One Hour.	Semi-diameter.	THE MOON'S Meridian Passage.
		Apparent Declination.	Var. in hour.					
Sun.	1	N15 12 15.1	45.12	3 3.42	0.302	15 53.9	2 30.3	h m 22 44.1
Mon.	2	15 30 10.4	44.49	3 10.41	0.280	15 53.7	3 20.7	.. ..
Tues.	3	15 47 50.4	43.84	3 16.87	0.258	15 53.5	4 9.1	.. ..
Wed.	4	16 5 14.6	43.18	3 22.78	0.235	15 53.3	4 50.0	.. ..
Thur.	5	16 22 22.8	42.50	3 28.16	0.213	15 53.0	5 40.8	.. ..
Frid.	6	16 39 14.7	41.81	3 33.00	0.190	15 52.8	6 24.2	.. ..
Sat.	7	16 55 49.9	41.11	3 37.29	0.167	15 52.6	7 6.8	.. ..
Sun.	8	17 12 8.2	40.40	3 41.02	0.144	15 52.4	7 49.5	.. ..
Mon.	9	17 28 9.2	39.68	3 44.21	0.121	15 52.2	8 33.3	.. ..
Tues.	10	17 43 52.7	38.94	3 46.84	0.098	15 52.0	9 19.1	.. ..
Wed.	11	17 59 18.4	38.20	3 48.91	0.074	15 51.8	10 8.0	.. ..
Thur.	12	18 14 26.1	37.44	3 50.41	0.051	15 51.6	11 0.7	.. ..
Frid.	13	18 29 15.4	36.67	3 51.34	0.027	15 51.4	11 57.4	.. ..
Sat.	14	18 43 46.1	35.89	3 51.70	0.003	15 51.2	12 57.5	.. ..
Sun.	15	18 57 57.9	35.09	3 51.48	0.021	15 51.0	13 59.2	.. ..
Mon.	16	19 11 50.6	34.29	3 50.69	0.045	15 50.8	15 0.5	.. ..
Tues.	17	19 25 23.9	33.48	3 49.32	0.069	15 50.6	15 59.5	.. ..
Wed.	18	19 38 37.5	32.65	3 47.37	0.093	15 50.4	16 55.1	.. ..
Thur.	19	19 51 31.2	31.81	3 44.85	0.117	15 50.2	17 47.5	.. ..
Frid.	20	20 4 4.6	30.97	3 41.77	0.140	15 50.0	18 37.4	.. ..
Sat.	21	20 16 17.6	30.11	3 38.13	0.163	15 49.8	19 25.6	.. ..
Sun.	22	20 28 9.8	29.24	3 33.93	0.186	15 49.6	20 13.3	.. ..
Mon.	23	20 39 41.0	28.36	3 29.19	0.209	15 49.5	21 1.3	.. ..
Tues.	24	20 50 50.9	27.47	3 23.91	0.231	15 49.3	21 50.2	.. ..
Wed.	25	21 1 39.4	26.57	3 18.11	0.252	15 49.1	22 40.2	.. ..
Thur.	26	21 12 6.1	25.66	3 11.81	0.273	15 49.0	23 31.2	.. ..
Frid.	27	21 22 10.9	24.74	3 5.01	0.293	15 48.8	24 22.6	.. ..
Sat.	28	21 31 53.6	23.81	2 57.74	0.312	15 48.6	0 22.6	.. ..
Sun.	29	21 41 13.9	22.88	2 50.01	0.331	15 48.5	1 13.5	.. ..
Mon.	30	21 50 11.7	21.93	2 41.85	0.349	15 48.4	2 2.9	.. ..
Tues.	31	21 58 46.7	20.98	2 33.27	0.366	15 48.2	2 50.4	.. ..

PHASES OF THE MOON.

h	m	h	m
May 5	13	May 4	16
First Quarter	..	Apogee	..
Full Moon	..	Perigee	..
Last Quarter	..	..	..
New Moon	..	..	..

JUNE, 1881.

Day of the Week.	Day of the Month.	AT APPARENT NOON THE SUN'S		Equation of Time to be subtr. from	added to Apparent Time.	Var. in One Hour.	Semi-diameter.	THE MOON'S Meridian Passage.
		Apparent Declination.	Var. in hour.					
Wed.	1	N22 6 58.8	20.02	2 24.29	0.382	15 48.1	3 35.9	h m 15 19.4
Thur.	2	22 14 47.7	19.05	2 14.93	0.308	15 48.0	4 19.5	.. ..
Frid.	3	22 22 13.4	18.08	2 5.21	0.412	15 47.9	5 1.9	.. ..
Sat.	4	22 29 15.6	17.10	1 55.15	0.426	15 47.7	5 43.9	.. ..
Sun.	5	22 35 54.2	16.11	1 44.77	0.439	15 47.6	6 26.2	.. ..
Mon.	6	22 42 9.1	15.12	1 34.08	0.451	15 47.5	7 10.1	.. ..
Tues.	7	22 48 0.1	14.12	1 23.11	0.463	15 47.4	7 56.5	.. ..
Wed.	8	22 53 27.0	13.12	1 11.87	0.473	15 47.3	8 46.5	.. ..
Thur.	9	22 58 29.9	12.12	1 0.39	0.483	15 47.2	9 40.8	.. ..
Frid.	10	23 3 8.6	11.11	0 48.67	0.493	15 47.1	10 39.4	.. ..
Sat.	11	23 7 23.0	10.09	0 36.73	0.501	15 47.0	11 41.3	.. ..
Sun.	12	23 11 13.0	9.07	0 24.60	0.509	15 46.9	12 44.6	.. ..
Mon.	13	23 14 38.5	8.05	0 12.28	0.516	15 46.8	13 46.6	.. ..
Tues.	14	23 17 39.5	7.03	0 0.19	0.523	15 46.7	14 45.7	.. ..
Wed.	15	23 20 15.9	6.00	0 12.81	0.528	15 46.7	15 41.2	.. ..
Thur.	16	23 22 27.6	4.97	0 25.55	0.533	15 46.6	16 33.4	.. ..
Frid.	17	23 24 14.5	3.94	0 38.40	0.537	15 46.5	17 23.1	.. ..
Sat.	18	23 25 36.6	2.90	0 51.33	0.540	15 46.4	18 11.5	.. ..
Sun.	19	23 26 33.9	1.87	1 4.32	0.542	15 46.4	18 59.4	.. ..
Mon.	20	23 27 6.3	0.83	1 17.35	0.543	15 46.3	19 47.7	.. ..
Tues.	21	23 27 13.9	0.20	1 30.39	0.543	15 46.2	20 36.9	.. ..
Wed.	22	23 26 56.7	1.24	1 43.42	0.542	15 46.2	21 27.1	.. ..
Thur.	23	23 26 14.6	2.27	1 56.41	0.540	15 46.1	22 17.8	.. ..
Frid.	24	23 25 7.7	3.30	2 9.34	0.537	15 46.1	23 8.5	.. ..
Sat.	25	23 23 36.1	4.33	2 22.18	0.532	15 46.1	23 58.2	.. ..
Sun.	26	23 21 39.7	5.36	2 34.89	0.527	15 46.0	.. ..	.. ..
Mon.	27	23 19 18.8	6.38	2 47.46	0.520	15 46.0	0 46.4	.. ..
Tues.	28	23 16 33.3	7.41	2 59.85	0.512	15 46.0	1 32.6	.. ..
Wed.	29	23 13 23.3	8.43	3 12.03	0.503	15 46.0	2 16.8	.. ..
Thur.	30	23 9 48.9	9.44	3 23.99	0.493	15 46.0	2 59.5	.. ..

PHASES OF THE MOON.

h	m	h	m
June 4	11	June 1	13
First Quarter	..	Perigee	..
Full Moon	..	Apogee	..
Last Quarter	..	..	..
New Moon	..	..	..

JULY, 1881.

Day of the Week.	Day of the Month.	AT APPARENT NOON THE SUN'S		Equation of Time to be added to Apparent Time.	Var. in One Hour.	Semi-diameter.	THE MOON'S Meridian Passage.
		Apparent Declination.	Var. in hour.				
Frid.	1	N23 5 50.1	10.45	3 35.69	0.482	15 46.0	3 41.2
Sat.	2	22 1 27.2	11.46	3 47.12	0.470	15 46.0	4 22.7
Sun.	3	22 56 40.2	12.46	3 58.24	0.457	15 46.0	5 5.0
Mon.	4	22 51 29.2	13.45	4 9.05	0.443	15 46.0	5 49.2
Tues.	5	22 45 54.4	14.44	4 19.51	0.428	15 46.0	6 36.1
Wed.	6	22 39 55.9	15.43	4 29.61	0.413	15 46.0	7 26.8
Thur.	7	22 33 33.9	16.40	4 39.33	0.397	15 46.0	8 21.9
Frid.	8	22 26 48.5	17.37	4 48.66	0.380	15 46.1	9 21.3
Sat.	9	22 19 39.9	18.34	4 57.58	0.363	15 46.1	10 23.6
Sun.	10	22 12 8.2	19.30	5 6.07	0.345	15 46.1	11 26.9
Mon.	11	22 4 13.7	20.25	5 14.13	0.326	15 46.2	12 28.7
Tues.	12	21 55 56.4	21.19	5 21.74	0.307	15 46.2	13 27.5
Wed.	13	21 47 16.6	22.13	5 28.88	0.283	15 46.3	14 23.1
Thur.	14	21 38 14.4	23.06	5 35.56	0.268	15 46.3	15 15.7
Frid.	15	21 28 49.9	23.98	5 41.76	0.248	15 46.4	16 6.2
Sat.	16	21 19 3.5	24.89	5 47.47	0.227	15 46.4	16 55.6
Sun.	17	21 8 55.2	25.80	5 52.68	0.207	15 46.5	17 44.8
Mon.	18	20 58 25.3	26.69	5 57.39	0.185	15 46.5	18 34.2
Tues.	19	20 47 34.1	27.57	6 1.58	0.164	15 46.6	19 24.3
Wed.	20	20 36 21.7	28.45	6 5.25	0.142	15 46.7	20 14.8
Thur.	21	20 24 48.5	29.31	6 8.38	0.119	15 46.7	21 5.3
Frid.	22	20 12 54.7	30.16	6 10.96	0.096	15 46.8	21 55.0
Sat.	23	20 0 40.6	31.01	6 12.98	0.072	15 46.9	22 43.5
Sun.	24	19 48 6.4	31.84	6 14.43	0.048	15 47.0	23 30.2
Mon.	25	19 35 12.5	32.65	6 15.30	0.024	15 47.1	* * *
Tues.	26	19 21 59.0	33.46	6 15.57	0.001	15 47.2	0 15.1
Wed.	27	19 8 26.2	34.26	6 15.25	0.026	15 47.3	0 58.3
Thur.	28	18 54 34.5	35.04	6 14.33	0.051	15 47.4	1 40.4
Frid.	29	18 40 24.2	35.81	6 12.79	0.077	15 47.5	2 21.9
Sat.	30	18 25 55.5	36.57	6 10.63	0.103	15 47.6	3 3.7
Sun.	31	18 11 8.8	37.32	6 7.86	0.128	15 47.8	3 46.6

PHASES OF THE MOON.

h	m
5	16.1
2	13.2
17	33.3
17	19.1

h	m
11	26.9
12	28.7
13	27.5
14	23.1
15	15.7
16	6.2
16	55.6
17	44.8
18	34.2
19	24.3
20	14.8
21	5.3
21	55.0
22	43.5
23	30.2
*	*
0	15.1
0	58.3
1	40.4
2	21.9
3	3.7
3	46.6

July	Perigee
4	11
11	25
17	
25	

AUGUST, 1881.

Day of the Week.	Day of the Month.	AT APPARENT NOON THE SUN'S		Equation of Time to be added to Apparent Time.	Var. in One Hour.	Semi-diameter.	THE MOON'S Meridian Passage.
		Apparent Declination.	Var. in hour.				
Mon.	1	N17 56 4.2	38.05	6 4.47	0.151	15 47.9	4 31.5
Tues.	2	17 40 42.2	38.78	6 0.45	0.180	15 48.0	5 19.4
Wed.	3	17 25 2.9	39.49	5 55.82	0.206	15 48.2	6 10.9
Thur.	4	17 9 6.8	40.18	5 50.57	0.231	15 48.3	7 6.5
Frid.	5	16 52 54.1	40.87	5 44.71	0.257	15 48.5	8 5.5
Sat.	6	16 36 25.1	41.54	5 38.23	0.283	15 48.6	9 6.8
Sun.	7	16 19 40.1	42.20	5 31.14	0.308	15 48.8	10 8.5
Mon.	8	16 2 39.4	42.85	5 23.46	0.332	15 48.9	11 8.7
Tues.	9	15 45 23.2	43.49	5 15.19	0.357	15 49.1	12 6.5
Wed.	10	15 27 51.9	44.11	5 6.33	0.381	15 49.3	13 1.7
Thur.	11	15 10 5.7	44.73	4 56.91	0.401	15 49.4	13 54.7
Frid.	12	14 52 4.9	45.33	4 46.93	0.427	15 49.6	14 46.3
Sat.	13	14 33 49.7	45.92	4 36.41	0.449	15 49.7	15 37.3
Sun.	14	14 15 20.5	46.50	4 25.36	0.471	15 49.9	16 28.1
Mon.	15	13 56 37.6	47.07	4 13.80	0.492	15 50.1	17 19.2
Tues.	16	13 37 41.2	47.62	4 1.73	0.513	15 50.3	18 10.4
Wed.	17	13 18 31.7	48.16	3 49.17	0.534	15 50.4	19 1.4
Thur.	18	12 59 9.5	48.69	3 36.12	0.554	15 50.6	19 51.6
Frid.	19	12 39 34.8	49.20	3 22.60	0.573	15 50.8	20 40.5
Sat.	20	12 19 48.0	49.70	3 8.61	0.592	15 51.0	21 27.7
Sun.	21	11 59 49.4	50.18	2 54.16	0.611	15 51.2	22 13.2
Mon.	22	11 39 39.4	50.65	2 39.26	0.630	15 51.4	22 57.0
Tues.	23	11 19 18.2	51.11	2 23.92	0.648	15 51.6	23 39.6
Wed.	24	10 58 46.3	51.55	2 8.16	0.665	15 51.8	* * *
Thur.	25	10 38 4.0	51.97	1 51.98	0.682	15 52.0	0 21.5
Frid.	26	10 17 11.6	52.39	1 35.40	0.699	15 52.3	1 3.4
Sat.	27	9 56 9.4	52.79	1 18.42	0.715	15 52.5	1 46.1
Sun.	28	9 34 57.8	53.18	1 1.07	0.731	15 52.7	2 30.3
Mon.	29	9 13 37.0	53.55	0 43.35	0.746	15 52.9	3 16.9
Tues.	30	8 52 7.5	53.90	0 25.28	0.760	15 53.1	4 6.5
Wed.	31	8 30 29.6	54.25	0 6.87	0.774	15 53.4	4 59.3

PHASES OF THE MOON.

h	m
16	42.4
9	6.8
4	57.3
8	45.2

h	m
23	39.6
0	21.5
1	3.4
1	46.1
2	30.3
3	16.9
4	6.5
4	59.3

August	Perigee
2	8
9	22
16	
24	

SEPTEMBER, 1881.

Day of the Week.	Day of the Month.	AT APPARENT NOON THE SUN'S		Equation of Time to be subd. from Apparent Time.	Var. in One Hour.	Semi-diameter.	THE MOON'S Meridian Passage.
		Apparent Declination.	Var. in hour.				
Thur.	1	N 8 8 43.6	54.58	0 11.86	0.787	15 53.6	5 55.3
Frid.	2	7 46 49.8	54.90	0 30.90	0.799	15 53.9	6 53.6
Sat.	3	7 24 48.6	55.20	0 50.23	0.811	15 54.1	7 53.0
Sun.	4	7 2 40.3	55.49	1 9.83	0.822	15 54.3	8 52.0
Mon.	5	6 40 25.1	55.77	1 29.69	0.832	15 54.6	9 49.5
Tues.	6	6 18 3.5	56.03	1 49.78	0.841	15 54.8	10 45.2
Wed.	7	5 55 35.6	56.29	2 10.08	0.850	15 55.1	11 39.2
Thur.	8	5 33 1.8	56.53	2 30.58	0.858	15 55.3	12 32.0
Frid.	9	5 10 22.4	56.75	2 51.24	0.864	15 55.6	13 24.3
Sat.	10	4 47 37.7	56.97	3 12.04	0.869	15 55.8	14 16.7
Sun.	11	4 24 47.9	57.18	3 32.95	0.873	15 56.1	15 9.2
Mon.	12	4 1 53.3	57.37	3 53.96	0.877	15 56.3	16 1.9
Tues.	13	3 38 54.3	57.54	4 15.03	0.879	15 56.6	16 54.2
Wed.	14	3 15 51.3	57.70	4 36.16	0.881	15 56.8	17 45.6
Thur.	15	2 52 44.5	57.85	4 57.31	0.882	15 57.1	18 35.6
Frid.	16	2 29 34.4	57.99	5 18.48	0.882	15 57.3	19 23.6
Sat.	17	2 6 21.2	58.11	5 39.63	0.881	15 57.6	20 9.7
Sun.	18	1 43 5.3	58.21	6 0.76	0.880	15 57.8	20 54.1
Mon.	19	1 19 47.0	58.30	6 21.85	0.878	15 58.1	21 37.1
Tues.	20	0 56 26.8	58.38	6 42.88	0.875	15 58.4	22 19.3
Wed.	21	0 33 4.9	58.44	7 3.83	0.871	15 58.6	23 1.5
Thur.	22	0 9 41.7	58.49	7 24.68	0.866	15 58.9	23 44.4
Frid.	23	0 13 42.4	58.52	7 45.41	0.861	15 59.2	23 * *
Sat.	24	0 37 7.1	58.53	8 6.00	0.855	15 59.4	0 23.6
Sun.	25	1 0 32.0	58.53	8 26.45	0.848	15 59.7	1 15.0
Mon.	26	1 23 56.7	58.52	8 46.72	0.841	16 0.0	2 4.1
Tues.	27	1 47 21.0	58.49	9 6.81	0.833	16 0.3	2 56.1
Wed.	28	2 10 44.4	58.45	9 26.69	0.824	16 0.6	3 50.8
Thur.	29	2 34 6.5	58.39	9 46.35	0.814	16 0.8	4 47.6
Frid.	30	2 57 27.0	58.31	10 5.76	0.804	16 1.1	5 45.2

PHASES OF THE MOON.

h	m	Phase
2	21	First Quarter
16	39.4	Full Moon
20	1.4	Last Quarter
23	54.5	New Moon
9	43.2	First Quarter

h	m	Event
6	8	Perigee
18	12	Apogee

OCTOBER, 1881.

Day of the Week.	Day of the Month.	AT APPARENT NOON THE SUN'S		Equation of Time to be subd. from Apparent Time.	Var. in One Hour.	Semi-diameter.	THE MOON'S Meridian Passage.
		Apparent Declination.	Var. in hour.				
Sat.	1	S 3 20 45.6	58.23	10 24.92	0.793	16 1.4	6 42.5
Sun.	2	3 44 1.9	58.12	10 43.81	0.781	16 1.7	7 38.5
Mon.	3	4 7 15.5	58.00	11 2.40	0.768	16 2.0	8 32.9
Tues.	4	4 30 26.1	57.87	11 20.67	0.754	16 2.3	9 25.9
Wed.	5	4 53 33.3	57.73	11 38.60	0.739	16 2.5	10 18.1
Thur.	6	5 16 36.9	57.57	11 56.16	0.724	16 2.8	11 10.0
Frid.	7	5 39 36.5	57.39	12 13.33	0.707	16 3.1	12 2.3
Sat.	8	6 2 31.8	57.20	12 30.09	0.689	16 3.4	12 55.3
Sun.	9	6 25 22.3	57.00	12 46.40	0.670	16 3.7	13 48.9
Mon.	10	6 48 7.9	56.79	13 2.25	0.650	16 3.9	14 42.7
Tues.	11	7 10 48.1	56.55	13 17.61	0.629	16 4.2	15 35.7
Wed.	12	7 33 22.5	56.31	13 32.46	0.608	16 4.5	16 27.3
Thur.	13	7 55 50.8	56.04	13 46.78	0.585	16 4.7	17 16.8
Frid.	14	8 18 12.6	55.76	14 0.55	0.562	16 5.0	18 4.0
Sat.	15	8 40 27.5	55.47	14 13.76	0.538	16 5.3	18 49.1
Sun.	16	9 2 35.1	55.16	14 26.39	0.514	16 5.5	19 32.5
Mon.	17	9 24 35.0	54.83	14 38.42	0.488	16 5.8	20 14.9
Tues.	18	9 46 26.8	54.48	14 49.83	0.462	16 6.1	20 57.0
Wed.	19	10 8 10.1	54.12	15 0.61	0.436	16 6.3	21 39.6
Thur.	20	10 29 44.6	53.74	15 10.74	0.408	16 6.6	22 23.6
Frid.	21	10 51 9.7	53.35	15 20.21	0.381	16 6.9	23 9.7
Sat.	22	11 12 25.2	52.93	15 29.01	0.352	16 7.1	23 58.6
Sun.	23	11 33 30.5	52.50	15 37.12	0.324	16 7.4	* * *
Mon.	24	11 54 25.3	52.06	15 44.54	0.294	16 7.7	0 50.7
Tues.	25	12 15 9.2	51.59	15 51.24	0.264	16 7.9	1 45.6
Wed.	26	12 35 41.7	51.11	15 57.23	0.234	16 8.2	2 42.7
Thur.	27	12 56 2.4	50.61	16 2.49	0.204	16 8.5	3 40.7
Frid.	28	13 16 11.0	50.10	16 7.02	0.173	16 8.7	4 38.0
Sat.	29	13 36 7.0	49.56	16 10.81	0.142	16 8.9	5 33.7
Sun.	30	13 55 50.0	49.01	16 13.85	0.111	16 9.2	6 27.4
Mon.	31	14 15 19.6	48.45	16 16.13	0.079	16 9.5	7 19.3

PHASES OF THE MOON.

h	m	Phase
1	39.0	Full Moon
14	26.0	Last Quarter
11	31.1	New Moon
16	47.1	First Quarter

h	m	Event
10	5	Perigee
6	6	Apogee

NOVEMBER, 1881.

Day of the Week.	Day of the Month.	AT APPARENT NOON		Equation of Time to be subtr. from added to Apparent Time.	Var. in One Hour.	Semi-diameter.	THE MOON'S Meridian Passage.		
		Apparent Declination.	Var. in hour.						
								h	m
Tues.	1	8 14 34 35.4	47.86	16 17.64	0.047	16 9.8	8 10.0	h	m
Wed.	2	14 53 36.9	47.26	16 18.37	0.014	16 10.0	9 0.4	14 2.9	..
Thur.	3	15 12 23.9	46.65	16 18.30	0.020	16 10.3	9 51.1	11 1.1	..
Frid.	4	15 30 55.9	46.01	16 17.43	0.053	16 10.5	10 42.8	4 21.2	..
Sat.	5	15 49 12.5	45.36	16 15.74	0.088	16 10.7	11 35.7	0 1.3	..
Sun.	6	16 7 13.4	44.70	16 13.21	0.123	16 11.0	12 29.4	..	..
Mon.	7	16 24 58.1	44.02	16 9.85	0.158	16 11.2	13 23.3	..	..
Tues.	8	16 42 26.4	43.33	16 5.64	0.193	16 11.4	14 16.3	..	..
Wed.	9	16 59 37.7	42.61	16 0.57	0.229	16 11.7	15 7.5	..	..
Thur.	10	17 16 31.7	41.88	15 54.64	0.265	16 11.9	15 56.3	..	..
Frid.	11	17 33 8.0	41.13	15 47.85	0.301	16 12.1	16 42.6	..	..
Sat.	12	17 49 26.1	40.37	15 40.20	0.337	16 12.3	17 26.8	..	..
Sun.	13	18 5 25.7	39.59	15 31.68	0.373	16 12.5	18 9.4	..	..
Mon.	14	18 21 6.3	38.79	15 22.30	0.409	16 12.7	18 51.2	..	..
Tues.	15	18 36 27.6	37.98	15 12.05	0.445	16 12.9	19 33.1	..	..
Wed.	16	18 51 29.2	37.15	15 0.95	0.480	16 13.1	20 16.0	..	..
Thur.	17	19 6 10.7	36.30	14 49.00	0.516	16 13.3	21 0.9	..	..
Frid.	18	19 20 31.6	35.44	14 36.19	0.551	16 13.5	21 48.6	..	..
Sat.	19	19 34 31.6	34.56	14 22.54	0.586	16 13.7	22 39.7	..	..
Sun.	20	19 48 10.3	33.66	14 8.06	0.620	16 13.9	23 34.5	..	..
Mon.	21	20 1 27.4	32.75	13 52.77	0.654	16 14.1	* * *	..	..
Tues.	22	20 14 22.5	31.83	13 36.68	0.687	16 14.3	0 32.3	..	..
Wed.	23	20 26 55.2	30.89	13 19.80	0.719	16 14.5	1 31.8	..	..
Thur.	24	20 39 5.1	29.93	13 2.15	0.751	16 14.7	2 31.1	..	..
Frid.	25	20 50 52.0	28.96	12 43.76	0.781	16 14.8	3 28.8	..	..
Sat.	26	21 2 15.4	27.98	12 24.64	0.811	16 15.0	4 24.0	..	..
Sun.	27	21 13 15.1	26.99	12 4.82	0.840	16 15.2	5 16.6	..	..
Mon.	28	21 23 50.8	25.98	11 44.31	0.869	16 15.4	6 7.2	..	..
Tues.	29	21 34 2.0	24.95	11 23.13	0.896	16 15.5	6 56.8	..	..
Wed.	30	21 43 48.5	23.92	11 1.29	0.923	16 15.7	7 46.1	..	..

PHASES OF THE MOON.

h	m	Event	h	m
November 5	13	Full Moon	November 13	Apogee
"	21	Last Quarter	"	Perigee
"	28	New Moon		
"	21	First Quarter		

DECEMBER, 1881.

Day of the Week.	Day of the Month.			Equation of Time to be subtr. from added to Apparent Time.	Var. in One Hour.	Semi-diameter.	THE MOON'S Meridian Passage.		
		Apparent Declination.	Var. in hour.						
								h	m
Thur.	1	S 21 53 10.1	22.87	10 38.82	0.949	16 15.9	8 36.1	h	m
Frid.	2	22 2 6.4	21.81	10 15.74	0.974	16 16.0	9 27.2	5 43.6	..
Sat.	3	22 10 37.2	20.75	9 52.05	0.999	16 16.2	10 19.6	8 4.7	..
Sun.	4	22 18 42.3	19.67	9 27.78	1.023	16 16.3	11 12.3	17 7.0	..
Mon.	5	22 26 21.4	18.58	9 2.95	1.046	16 16.4	12 5.9	8 41.5	..
Tues.	6	22 33 34.2	17.48	8 37.59	1.068	16 16.6	12 57.9	..	..
Wed.	7	22 40 20.6	16.38	8 11.71	1.089	16 16.7	13 48.0	..	..
Thur.	8	22 46 40.3	15.26	7 45.34	1.109	16 16.8	14 35.7	..	..
Frid.	9	22 52 33.1	14.14	7 18.50	1.128	16 16.9	15 21.0	..	..
Sat.	10	22 57 58.9	13.01	6 51.22	1.145	16 17.0	16 4.2	..	..
Sun.	11	23 2 57.4	11.86	6 23.54	1.161	16 17.1	16 46.1	..	..
Mon.	12	23 7 28.4	10.72	5 55.48	1.177	16 17.2	17 27.5	..	..
Tues.	13	23 11 31.8	9.56	5 27.06	1.191	16 17.3	18 9.2	..	..
Wed.	14	23 15 7.5	8.41	4 58.32	1.204	16 17.4	18 52.2	..	..
Thur.	15	23 18 15.3	7.24	4 29.28	1.215	16 17.5	19 37.6	..	..
Frid.	16	23 20 55.1	6.07	3 59.99	1.225	16 17.5	20 26.2	..	..
Sat.	17	23 23 6.8	4.90	3 30.47	1.234	16 17.6	21 18.8	..	..
Sun.	18	23 24 54.4	3.73	3 0.76	1.241	16 17.7	22 15.2	..	..
Mon.	19	23 26 5.7	2.55	2 30.89	1.247	16 17.7	23 14.8	..	..
Tues.	20	23 26 52.8	1.37	2 0.91	1.251	16 17.8	* * *	..	..
Wed.	21	23 27 11.5	0.19	1 30.86	1.253	16 17.9	0 15.8	..	..
Thur.	22	23 27 2.0	0.99	1 0.78	1.253	16 17.9	1 16.4	..	..
Frid.	23	23 26 24.2	2.16	0 30.70	1.252	16 18.0	2 14.7	..	..
Sat.	24	23 25 18.1	3.34	0 0.67	1.249	16 18.0	3 10.3	..	..
Sun.	25	23 23 43.7	4.51	0 29.27	1.245	16 18.1	4 3.2	..	..
Mon.	26	23 21 41.2	5.69	0 59.08	1.239	16 18.1	4 54.2	..	..
Tues.	27	23 19 10.5	6.86	1 28.73	1.231	16 18.1	5 44.0	..	..
Wed.	28	23 16 11.7	8.03	1 58.19	1.223	16 18.2	6 33.7	..	..
Thur.	29	23 12 44.9	9.20	2 27.43	1.213	16 18.2	7 24.0	..	..
Frid.	30	23 8 50.2	10.36	2 56.41	1.201	16 18.2	8 15.1	..	..
Sat.	31	23 4 27.7	11.51	3 25.10	1.189	16 18.2	9 7.1	..	..

PHASES OF THE MOON.

h	m	Event	h	m
December 5	13	Full Moon	December 10	Apogee
"	20	Last Quarter	"	Perigee
"	27	New Moon		
"	20	First Quarter		

1882.

JANUARY, 1882.

Day of the Week.	Day of the Month.	AT APPARENT NOON THE SUN'S				Equation of Time to be added to Apparent Time.		Var. in one Hour.	Semi-diameter.	THE MOON'S Meridian Passage.		
		Apparent Declination.		Var. in hour.	Apparent Time.							
		°	'	"	"	m	s	s	'	"	h	m
Sun.	1	S 22	59	37.7	12.66	3	53	48	1.176	16 18.2	9	59.4
Mon.	2	22	54	20.1	13.80	4	21	53	1.161	16 18.2	10	51.2
Tues.	3	22	48	35.2	14.94	4	49	20	1.145	16 18.2	11	41.6
Wed.	4	22	42	23.1	16.06	5	16	48	1.128	16 18.2	12	30.1
Thur.	5	22	35	44.1	17.19	5	43	33	1.110	16 18.2	13	16.3
Frid.	6	22	28	38.2	18.30	6	9	74	1.090	16 18.1	14	0.4
Sat.	7	22	21	5.7	19.41	6	35	67	1.070	16 18.1	14	42.8
Sun.	8	22	13	6.7	20.50	7	1	11	1.049	16 18.1	15	24.2
Mon.	9	22	4	41.6	21.59	7	26	02	1.027	16 18.0	16	5.4
Tues.	10	21	55	50.6	22.66	7	50	40	1.004	16 18.0	16	47.1
Wed.	11	21	46	33.9	23.72	8	14	21	0.980	16 17.9	17	30.5
Thur.	12	21	36	51.7	24.78	8	37	45	0.956	16 17.9	18	16.3
Frid.	13	21	26	44.3	25.82	9	0	08	0.930	16 17.8	19	5.4
Sat.	14	21	16	12.1	26.85	9	22	08	0.904	16 17.7	19	58.4
Sun.	15	21	5	15.3	27.87	9	43	45	0.876	16 17.7	20	55.2
Mon.	16	20	53	54.2	28.88	10	4	15	0.849	16 17.6	21	54.9
Tues.	17	20	42	9.1	29.87	10	24	18	0.820	16 17.5	22	56.0
Wed.	18	20	30	0.5	30.84	10	43	50	0.790	16 17.4	23	56.5
Thur.	19	20	17	28.7	31.80	11	2	10	0.759	16 17.3	*	*
Frid.	20	20	4	34.1	32.74	11	19	95	0.728	16 17.2	0	55.2
Sat.	21	19	51	17.0	33.67	11	37	03	0.695	16 17.1	1	51.4
Sun.	22	19	37	37.7	34.59	11	53	33	0.663	16 17.0	2	45.4
Mon.	23	19	23	36.7	35.49	12	8	84	0.629	16 16.9	3	37.7
Tues.	24	19	9	14.4	36.37	12	23	54	0.595	16 16.8	4	29.2
Wed.	25	18	54	31.0	37.24	12	37	42	0.561	16 16.7	5	20.5
Thur.	26	18	39	27.1	38.09	12	50	48	0.527	16 16.6	6	12.1
Frid.	27	18	24	2.9	38.92	13	2	72	0.493	16 16.5	7	4.0
Sat.	28	18	8	18.9	39.74	13	14	12	0.458	16 16.4	7	56.1
Sun.	29	17	52	15.5	40.51	13	24	69	0.423	16 16.2	8	47.6
Mon.	30	17	35	53.0	41.33	13	34	43	0.388	16 16.1	9	38.0
Tues.	31	17	19	11.8	42.10	13	43	33	0.354	16 15.9	10	26.6

PHASES OF THE MOON.

h	m	h	m
22	58.5	16	18.2
3	47.3	15	24.2
4	35.0	14	42.8
19	44.6	13	16.3
		12	30.1
		11	41.6
		10	51.2
		9	59.4
Full Moon	January 3	Apogee	January 7
Last Quarter	January 12	Perigee	January 20
New Moon	January 19		
First Quarter	January 25		

FEBRUARY, 1882.

Day of the Week.	Day of the Month.	AT APPARENT NOON THE SUN'S				Equation of Time to be added to Apparent Time.		Var. in one Hour.	Semi-diameter.	THE MOON'S Meridian Passage.		
		Apparent Declination.		Var. in hour.	Apparent Time.							
		°	'	"	"	m	s	s	'	"	h	m
Wed.	1	S 17	2	12.4	42.85	13	51	40	0.319	16 15.8	11	13.3
Thur.	2	16	44	55.1	43.59	13	58	64	0.285	16 15.7	11	58.0
Frid.	3	16	27	20.2	44.31	14	5	06	0.250	16 15.5	12	41.0
Sat.	4	16	9	28.3	45.01	14	10	66	0.216	16 15.3	13	22.8
Sun.	5	15	51	19.7	45.70	14	15	45	0.183	16 15.2	14	4.0
Mon.	6	15	32	54.8	46.37	14	19	43	0.149	16 15.0	14	45.5
Tues.	7	15	14	13.9	47.03	14	22	62	0.116	16 14.8	15	27.9
Wed.	8	14	55	17.5	47.66	14	25	01	0.084	16 14.6	16	12.0
Thur.	9	14	36	6.0	48.29	14	26	63	0.052	16 14.5	16	58.7
Frid.	10	14	16	39.8	48.89	14	27	49	0.020	16 14.3	17	48.5
Sat.	11	13	56	59.3	49.48	14	27	59	0.011	16 14.1	18	41.6
Sun.	12	13	37	4.9	50.05	14	26	94	0.042	16 13.9	19	37.9
Mon.	13	13	16	57.0	50.60	14	25	56	0.073	16 13.7	20	36.4
Tues.	14	12	56	36.1	51.13	14	23	45	0.103	16 13.5	21	35.9
Wed.	15	12	36	2.6	51.65	14	20	62	0.133	16 13.3	22	34.9
Thur.	16	12	15	16.9	52.15	14	17	07	0.163	16 13.1	23	32.6
Frid.	17	11	54	19.5	52.63	14	12	82	0.192	16 12.8	*	*
Sat.	18	11	33	10.9	53.08	14	7	87	0.220	16 12.6	0	28.7
Sun.	19	11	11	51.5	53.52	14	2	24	0.249	16 12.4	1	23.4
Mon.	20	10	50	21.7	53.95	13	55	92	0.277	16 12.2	2	17.3
Tues.	21	10	28	41.9	54.36	13	48	94	0.304	16 12.0	3	10.8
Wed.	22	10	6	52.5	54.75	13	41	31	0.331	16 11.8	4	4.3
Thur.	23	9	44	54.0	55.12	13	33	03	0.358	16 11.5	4	57.8
Frid.	24	9	22	46.8	55.47	13	24	12	0.384	16 11.3	5	51.1
Sat.	25	9	0	31.3	55.81	13	14	61	0.409	16 11.1	6	43.6
Sun.	26	8	38	7.8	56.14	13	4	50	0.433	16 10.9	7	34.7
Mon.	27	8	15	36.8	56.44	12	53	82	0.456	16 10.6	8	23.9
Tues.	28	7	52	58.7	56.73	12	42	59	0.479	16 10.4	9	11.0

PHASES OF THE MOON.

h	m	h	m
17	58.0	23	23
20	33.7	16	18.2
14	49.6	15	24.2
9	30.7	14	42.8
		13	16.3
		12	30.1
		11	41.6
		10	51.2
		9	59.4
Full Moon	February 2	Apogee	February 17
Last Quarter	February 10	Perigee	February 23
New Moon	February 17		
First Quarter	February 24		

MARCH, 1882.

Day of the Week.	Day of the Month.	AT APPARENT NOON THE SUN'S		Equation of Time to be added to		Semi-diameter.	THE MOON'S Meridian Passage.
		Apparent Declination.	Var. in hour.	subt. from Apparent Time.	Var. in One Hour.		
Wed.	1	S 7 30 13.9	57.00	12 30.82	0.501	16 10.2	9 56.1
Thur.	2	7 7 22.6	57.26	12 18.53	0.523	16 9.9	10 39.5
Frid.	3	6 44 25.4	57.50	12 5 74	0.543	16 9.7	11 21.7
Sat.	4	6 21 22.6	57.73	11 52.48	0.562	16 9.4	12 3.2
Sun.	5	5 58 14.5	57.94	11 38.76	0.580	16 9.2	12 44.8
Mon.	6	5 35 1.5	58.14	11 24.62	0.598	16 8.9	13 27.0
Tues.	7	5 11 44.0	58.32	11 10.07	0.614	16 8.7	14 10.7
Wed.	8	4 48 22.3	58.48	10 55.14	0.630	16 8.4	14 56.5
Thur.	9	4 24 56.8	58.63	10 39.84	0.644	16 8.1	15 44.7
Frid.	10	4 1 27.9	58.77	10 24.21	0.658	16 7.9	16 35.7
Sat.	11	3 37 55.9	58.89	10 8.26	0.670	16 7.6	17 29.4
Sun.	12	3 14 21.2	58.99	9 52.03	0.682	16 7.3	18 25.1
Mon.	13	2 50 44.2	59.08	9 35.32	0.693	16 7.1	19 21.9
Tues.	14	2 27 5.3	59.16	9 18.76	0.703	16 6.8	20 18.9
Wed.	15	2 3 24.7	59.21	9 1 77	0.712	16 6.5	21 15.3
Thur.	16	1 39 43.0	59.25	8 44.57	0.721	16 6.2	22 10.8
Frid.	17	1 16 0.6	59.27	8 27.16	0.729	16 6.0	23 5.6
Sat.	18	0 52 17.8	59.28	8 9.57	0.736	16 5.7	* * *
Sun.	19	0 28 35.0	59.27	7 51.82	0.743	16 5.4	0 0.1
Mon.	20	S 0 4 52.6	59.25	7 33.92	0.749	16 5.2	0 54.6
Tues.	21	N 0 18 49.0	59.21	7 15.89	0.754	16 4.9	1 49.6
Wed.	22	0 42 29.5	59.15	6 57.75	0.758	16 4.6	2 44.9
Thur.	23	1 6 8.4	59.08	6 39.51	0.762	16 4.3	3 40.2
Frid.	24	1 29 45.4	59.00	6 21 19	0.765	16 4.1	4 34.8
Sat.	25	1 53 20.2	58.90	6 2 81	0.767	16 3.8	5 27.9
Sun.	26	2 16 52.4	58.78	5 44.38	0.768	16 3.5	6 18.7
Mon.	27	2 40 21.5	58.65	5 25.93	0.769	16 3.3	7 7.1
Tues.	28	3 3 47.4	58.50	5 7.48	0.769	16 3.0	7 53.1
Wed.	29	3 27 9.6	58.34	4 49.04	0.768	16 2.7	8 37.1
Thur.	30	3 50 27.8	58.17	4 30.64	0.765	16 2.4	9 19.6
Frid.	31	4 13 41.7	57.98	4 12.30	0.762	16 2.2	10 1.3

PHASES OF THE MOON.

March 4	Full Moon	h m	12 39.5
" 12	Last Quarter	" "	9 27.7
" 19	New Moon	" "	0 17.2
" 26	First Quarter	" "	1 33.1
March 2	Perigee	h	23
" 18	Apogee	"	1
" 30	Apogee	"	9

APRIL, 1882.

Day of the Week.	Day of the Month.	AT APPARENT NOON THE SUN'S		Equation of Time to be added to		Semi-diameter.	THE MOON'S Meridian Passage.
		Apparent Declination.	Var. in hour.	subt. from Apparent Time.	Var. in One Hour.		
Sat.	1	N 4 36 50.9	57.78	3 54.04	0.759	16 1.9	10 42.9
Sun.	2	4 59 55.1	57.56	3 35.88	0.754	16 1.6	11 25.2
Mon.	3	5 22 54.4	57.34	3 17.85	0.748	16 1.4	12 8.8
Tues.	4	5 45 47.2	57.09	2 59.96	0.742	16 1.1	12 54.3
Wed.	5	6 8 34.5	56.84	2 42.25	0.734	16 0.8	13 42.2
Thur.	6	6 31 16.5	56.57	2 24.73	0.725	16 0.5	14 32.7
Frid.	7	6 53 49.9	56.29	2 7.43	0.716	16 0.2	15 25.6
Sat.	8	7 16 17.4	55.99	1 50.36	0.706	16 0.0	16 20.2
Sun.	9	7 38 37.6	55.69	1 33.55	0.695	15 59.7	17 15.7
Mon.	10	8 0 50.3	55.36	1 17.02	0.683	15 59.4	18 11.1
Tues.	11	8 22 55.0	55.02	1 0.78	0.670	15 59.1	19 5.8
Wed.	12	8 44 51.4	54.67	0 44.85	0.657	15 58.9	19 59.6
Thur.	13	9 6 39.1	54.30	0 29.24	0.643	15 58.6	20 52.7
Frid.	14	9 28 17.8	53.92	0 13.98	0.629	15 58.3	21 45.5
Sat.	15	9 49 47.2	53.52	0 0.93	0.614	15 58.0	22 38.8
Sun.	16	10 11 6.9	53.11	0 15.43	0.598	15 57.8	23 33.1
Mon.	17	10 32 16.5	52.68	0 29.65	0.582	15 57.5	* * *
Tues.	18	10 53 15.7	52.24	0 43.42	0.566	15 57.2	0 23.4
Wed.	19	11 14 4.2	51.79	0 56.80	0.549	15 57.0	1 24.6
Thur.	20	11 34 41.5	51.32	1 9.76	0.531	15 56.7	2 20.8
Frid.	21	11 55 7.4	50.83	1 22.31	0.514	15 56.5	3 16.0
Sat.	22	12 15 21.5	50.34	1 34.43	0.496	15 56.2	4 9.2
Sun.	23	12 35 23.5	49.83	1 46.12	0.478	15 56.0	4 69.8
Mon.	24	12 55 13.1	49.30	1 57.36	0.459	15 55.7	5 47.5
Tues.	25	13 14 49.9	48.76	2 8.14	0.440	15 55.5	6 32.6
Wed.	26	13 34 13.6	48.21	2 18.46	0.420	15 55.2	7 15.8
Thur.	27	13 53 23.9	47.64	2 28.30	0.400	15 55.0	7 57.8
Frid.	28	14 12 20.4	47.06	2 37.66	0.379	15 54.8	8 39.4
Sat.	29	14 31 2.9	46.47	2 46.51	0.358	15 54.5	9 21.3
Sun.	30	14 49 31.0	45.87	2 54.86	0.337	15 54.3	10 4.4

PHASES OF THE MOON.

April 3	Full Moon	h m	5 46.7
" 10	Last Quarter	" "	18 29.9
" 17	New Moon	" "	9 38.0
" 24	First Quarter	" "	18 55.9
April 15	Perigee	h	5
" 27	Apogee	"	3

MAY, 1882

Day of the Week.	Day of the Month.	AT APPARENT NOON THE SUN'S		Equation of Time to be subt. from		Semi-diameter.	THE MOON'S Meridian Passage.		
		Apparent Declination.	Var. in hour.	added to Apparent Time.			Var. in One Hour.	h m	
				m	s			s	'	h	m
Mon.	1	N15 7 44.5	45.25	3 2.68	0.315	15 54.1	10 49.5	h m	20 30.8
Tues.	2	15 25 43.0	44.62	3 9.97	0.292	15 53.8	11 37.1	..	0 31.7
Wed.	3	15 43 26.3	43.98	3 16.71	0.269	15 53.6	12 27.4	..	19 32.6
Thur.	4	16 0 54.0	43.33	3 22.90	0.246	15 53.4	13 20.5	..	12 41.0
Frid.	5	16 18 5.9	42.66	3 28.53	0.223	15 53.1	14 15.5	..	..
Sat.	6	16 35 1.7	41.98	3 33.58	0.199	15 52.9	15 11.4	..	..
Sun.	7	16 51 41.0	41.29	3 38.06	0.174	15 52.7	16 7.2	..	..
Mon.	8	17 8 3.5	40.58	3 41.95	0.150	15 52.5	17 1.8	..	..
Tues.	9	17 24 9.0	39.87	3 45.26	0.125	15 52.2	17 55.0	..	..
Wed.	10	17 39 57.2	39.14	3 47.97	0.100	15 52.0	18 47.0	..	..
Thur.	11	17 55 27.7	38.40	3 50.08	0.076	15 51.8	19 33.3	..	..
Frid.	12	18 10 40.3	37.64	3 51.60	0.051	15 51.6	20 29.6	..	..
Sat.	13	18 25 34.6	36.87	3 52.53	0.026	15 51.4	21 21.7	..	..
Sun.	14	18 40 10.3	36.10	3 52.86	0.002	15 51.2	22 15.2	..	..
Mon.	15	18 54 27.2	35.31	3 52.61	0.023	15 51.0	23 10.2	..	..
Tues.	16	19 8 25.0	34.50	3 51.78	0.047	15 50.8	* * *	..	..
Wed.	17	19 22 3.3	33.69	3 50.37	0.071	15 50.6	0 6.1	..	..
Thur.	18	19 35 22.0	32.86	3 48.39	0.094	15 50.4	1 2.1	..	..
Frid.	19	19 48 20.8	32.03	3 45.87	0.116	15 50.2	1 56.9	..	..
Sat.	20	20 0 59.3	31.18	3 42.80	0.139	15 50.0	2 49.5	..	..
Sun.	21	20 13 17.3	30.32	3 39.20	0.161	15 49.9	3 39.2	..	..
Mon.	22	20 25 14.7	29.45	3 35.09	0.182	15 49.7	4 26.1	..	..
Tues.	23	20 36 51.0	28.57	3 30.47	0.203	15 49.5	5 10.5	..	..
Wed.	24	20 48 6.1	27.63	3 25.35	0.224	15 49.4	5 53.2	..	..
Thur.	25	20 58 59.8	26.78	3 19.74	0.244	15 49.2	6 34.8	..	..
Frid.	26	21 9 31.7	25.87	3 13.66	0.263	15 49.1	7 16.3	..	..
Sat.	27	21 19 41.8	24.96	3 7.11	0.282	15 48.9	7 58.6	..	..
Sun.	28	21 29 29.7	24.03	3 0.10	0.301	15 48.8	8 42.6	..	..
Mon.	29	21 38 55.3	23.10	2 52.65	0.320	15 48.6	9 29.0	..	..
Tues.	30	21 47 58.5	22.16	2 44.76	0.338	15 48.5	10 18.4	..	..
Wed.	31	21 56 33.9	21.21	2 36.45	0.355	15 48.3	11 10.9	..	..

PHASES OF THE MOON.

May 10	Full Moon	May 12	Perigee
" 10	Last Quarter	" 15	Apogee
" 16	New Moon	" 21	
" 24	First Quarter		

JUNE, 1882.

Day of the Week.	Day of the Month.	AT APPARENT NOON THE SUN'S		Equation of Time to be subt. from		Semi-diameter.	THE MOON'S Meridian Passage.		
		Apparent Declination.	Var. in hour.	added to Apparent Time.			Var. in One Hour.	h m	
				m	s			s	'	h	m
Thur.	1	N22 4 56.5	20.25	2 27.72	0.372	15 48.2	12 6.2	h m	8 33.2
Frid.	2	22 12 51.1	19.29	2 18.60	0.388	15 48.1	13 3.2	..	5 9.4
Sat.	3	22 20 22.5	18.32	2 9.09	0.404	15 47.9	14 0.5	..	14 58.9
Sun.	4	22 27 30.5	17.34	1 59.20	0.419	15 47.8	14 58.9	..	..
Mon.	5	22 34 15.0	16.36	1 48.96	0.434	15 47.7	15 51.5	..	..
Tues.	6	22 40 35.8	15.37	1 38.37	0.448	15 47.6	16 44.2	..	..
Wed.	7	22 46 32.8	14.37	1 27.16	0.461	15 47.4	17 35.6	..	..
Thur.	8	22 52 5.7	13.37	1 16.24	0.474	15 47.3	18 26.2	..	..
Frid.	9	22 57 14.6	12.37	1 4.73	0.485	15 47.2	19 17.0	..	..
Sat.	10	23 1 59.3	11.35	0 52.94	0.496	15 47.1	20 8.7	..	..
Sun.	11	23 6 19.6	10.34	0 40.91	0.506	15 47.0	21 1.7	..	..
Mon.	12	23 10 15.6	9.32	0 28.65	0.515	15 46.9	21 56.0	..	..
Tues.	13	23 13 47.0	8.30	0 16.18	0.523	15 46.8	22 51.1	..	..
Wed.	14	23 16 53.9	7.27	0 3.54	0.530	15 46.7	23 45.9	..	..
Thur.	15	23 19 36.1	6.24	0 9.24	0.535	15 46.7	* * *	..	..
Frid.	16	23 21 53.6	5.22	0 22.14	0.539	15 46.6	0 39.3	..	..
Sat.	17	23 23 46.5	4.19	0 35.13	0.542	15 46.5	1 30.4	..	..
Sun.	18	23 25 14.6	3.16	0 48.18	0.544	15 46.4	2 18.8	..	..
Mon.	19	23 26 18.0	2.12	1 1.26	0.545	15 46.3	3 4.6	..	..
Tues.	20	23 26 56.5	1.03	1 14.35	0.545	15 46.3	3 48.2	..	..
Wed.	21	23 27 10.2	0.05	1 27.42	0.544	15 46.3	4 30.3	..	..
Thur.	22	23 26 59.1	0.98	1 40.45	0.541	15 46.2	5 11.7	..	..
Frid.	23	23 26 23.2	2.01	1 53.41	0.538	15 46.2	5 53.3	..	..
Sat.	24	23 25 22.6	3.04	2 6.27	0.534	15 46.2	6 36.0	..	..
Sun.	25	23 23 57.3	4.07	2 19.02	0.528	15 46.2	7 20.6	..	..
Mon.	26	23 22 7.2	5.10	2 31.63	0.522	15 46.1	8 8.0	..	..
Tues.	27	23 19 52.5	6.12	2 44.08	0.515	15 46.1	8 58.7	..	..
Wed.	28	23 17 13.3	7.15	2 56.35	0.507	15 46.1	9 52.7	..	..
Thur.	29	23 14 9.5	8.16	3 8.43	0.499	15 46.1	10 49.4	..	..
Frid.	30	23 10 41.4	9.18	3 20.29	0.489	15 46.0	11 47.6	..	..

PHASES OF THE MOON.

June 8	Full Moon	June 6	Perigee
" 15	Last Quarter	" 21	Apogee
" 23	New Moon		
" 30	First Quarter		

JULY, 1882.

Day of the Week.	Day of the Month.	AT APPARENT NOON THE SUN'S		Equation of Time to be added to Apparent Time.	Var. in One Hour.	Semi-diameter.	THE MOON'S Meridian Passage.
		Apparent Declination.	Var. in hour.				
Sat.	1	N23 6 48.9	10.19	3 31.91	0.479	15 46.0	12 45.9
Sun.	2	23 2 32.2	11.20	3 43.28	0.468	15 46.0	13 42.9
Mon.	3	22 57 51.4	12.20	3 54.37	0.456	15 46.0	14 38.1
Tues.	4	22 52 46.5	13.20	4 5 18	0.444	15 46.0	15 31.4
Wed.	5	22 47 17.6	14.20	4 15.68	0.431	15 46.0	16 23.3
Thur.	6	22 41 24.9	15.19	4 25.86	0.417	15 46.0	17 14.6
Frid.	7	22 35 8.5	16.17	4 35.71	0.403	15 46.1	18 6.0
Sat.	8	22 28 28.6	17.15	4 45.20	0.388	15 46.1	18 58.2
Sun.	9	22 21 25.3	18.12	4 54.32	0.372	15 46.1	19 51.3
Mon.	10	22 13 58.8	19.09	5 3.06	0.356	15 46.1	20 45.2
Tues.	11	22 6 9.2	20.04	5 11.39	0.338	15 46.1	21 39.2
Wed.	12	21 57 56.8	20.99	5 19.29	0.320	15 46.2	22 32.3
Thur.	13	21 49 21.8	21.93	5 26.75	0.301	15 46.2	23 23.7
Frid.	14	21 40 24.4	22.85	5 33.74	0.281	15 46.3	* * *
Sat.	15	21 31 4.9	23.77	5 40.24	0.260	15 46.3	0 12.9
Sun.	16	21 21 23.3	24.69	5 46.24	0.239	15 46.4	0 59.6
Mon.	17	21 11 20.0	25.59	5 51.72	0.217	15.46.4	1 44.1
Tues.	18	21 0 55.2	26.48	5 56.67	0.195	15 46.5	2 26.8
Wed.	19	20 50 9.1	27.36	6 1.06	0.171	15 46.6	3 8.4
Thur.	20	20 39 1.9	28.23	6 4.89	0.148	15 46.7	3 49.7
Frid.	21	20 27 33.9	29.09	6 8.16	0.124	15 46.7	4 31.5
Sat.	22	20 15 45.4	29.94	6 10.84	0.099	15 46.8	5 14.7
Sun.	23	20 3 36.6	30.79	6 12.93	0.075	15 46.9	6 0.0
Mon.	24	19 51 7.7	31.62	6 14.43	0.050	15 47.0	6 48.1
Tues.	25	19 38 19.0	32.43	6 15.33	0.025	15 47.1	7 39.4
Wed.	26	19 25 10.9	33.24	6 15.62	0.000	15 47.2	8 33.9
Thur.	27	19 11 43.5	34.04	6 15.31	0.026	15 47.3	9 30.9
Frid.	28	18 57 57.1	34.82	6 14.38	0.051	15 47.4	10 29.3
Sat.	29	18 43 52.0	35.60	6 12.84	0.077	15 47.6	11 27.6
Sun.	30	18 29 28.4	36.36	6 10.69	0.102	15 47.7	12 24.9
Mon.	31	18 14 46.6	37.11	6 7.93	0.127	15 47.8	13 20.7

PHASES OF THE MOON.

h	m
9 51.8	13
19 1.3	8
22 17.5	12
2 1.5	

h	m
13	13
8	8
12	12

h	m
7	7
14	14
22	22
30	30

h	m
3	3
19	19
31	31

AUGUST, 1882.

Day of the Week.	Day of the Month.	AT APPARENT NOON THE SUN'S		Equation of Time to be added to Apparent Time.	Var. in One Hour.	Semi-diameter.	THE MOON'S Meridian Passage.
		Apparent Declination.	Var. in hour.				
Tues.	1	N17 50 46.9	37.86	6 4.57	0.152	15 47.9	14 15.0
Wed.	2	17 44 29.5	38.59	6 0.62	0.177	15 48.1	15 8.4
Thur.	3	17 28 54.6	39.31	5 56.07	0.202	15 48.2	16 1.4
Frid.	4	17 13 2.5	40.02	5 50.93	0.226	15 48.3	16 54.3
Sat.	5	16 56 53.6	40.71	5 45.22	0.250	15 48.4	17 48.0
Sun.	6	16 40 28.2	41.40	5 38.94	0.274	15 48.6	18 41.9
Mon.	7	16 23 46.5	42.07	5 32.09	0.297	15 48.7	19 35.6
Tues.	8	16 6 48.8	42.73	5 24.67	0.321	15 48.9	20 28.6
Wed.	9	15 49 35.5	43.37	5 16.68	0.345	15 49.0	21 20.0
Thur.	10	15 32 7.0	44.00	5 8.13	0.368	15 49.2	22 9.3
Frid.	11	15 14 23.5	44.62	4 59.02	0.391	15 49.3	22 56.4
Sat.	12	14 56 25.3	45.22	4 49.36	0.414	15 49.5	23 41.4
Sun.	13	14 38 12.9	45.81	4 39.15	0.437	15 49.7	* * *
Mon.	14	14 19 46.4	46.39	4 28.38	0.460	15 49.8	0 24.6
Tues.	15	14 1 6.3	46.95	4 17.07	0.482	15 50.0	1 6.0
Wed.	16	13 42 12.8	47.50	4 5.23	0.504	15 50.2	1 48.0
Thur.	17	13 23 6.3	48.04	3 52.86	0.526	15 50.4	2 29.5
Frid.	18	13 3 47.1	48.56	3 39.97	0.548	15 50.6	3 11.9
Sat.	19	12 44 15.6	49.06	3 26.58	0.569	15 50.8	3 55.8
Sun.	20	12 24 32.0	49.56	3 12.68	0.589	15 51.0	4 41.9
Mon.	21	12 4 36.7	50.04	2 58.30	0.609	15 51.2	5 30.6
Tues.	22	11 44 30.0	50.51	2 43.45	0.628	15 51.4	6 22.2
Wed.	23	11 24 12.2	50.96	2 28.14	0.647	15 51.6	7 16.4
Thur.	24	11 3 43.7	51.41	2 12.37	0.666	15 51.8	8 12.6
Frid.	25	10 43 4.7	51.84	1 56.16	0.684	15 52.0	9 9.9
Sat.	26	10 22 15.6	52.25	1 39.53	0.701	15 52.2	10 7.2
Sun.	27	10 1 16.7	52.65	1 22.50	0.718	15 52.5	11 3.9
Mon.	28	9 40 8.2	53.05	1 5.08	0.733	15 52.7	11 59.7
Tues.	29	9 18 50.5	53.42	0 47.30	0.748	15 52.9	12 54.9
Wed.	30	8 57 23.9	53.79	0 29.18	0.762	15 53.1	13 49.9
Thur.	31	8 35 48.5	54.15	0 10.73	0.775	15 53.3	14 44.9

PHASES OF THE MOON.

h	m
16 13.0	13
9 10.0	9
12 54.8	12
9 18.6	9

h	m
21	21
20	20

h	m
5	5
13	13
21	21
28	28

h	m
15	15
28	28

SEPTEMBER, 1882.

Day of the Week.	Day of the Month.	AT APPARENT NOON THE SUN'S		Equation of Time to be subd. from Apparent Time.	Var. in One Hour.	Semi-diameter.	THE MOON'S Meridian Passage.
		Apparent Declination.	Var. in 1 hour.				
Frid.	1	N 8 14 48	54:49	0 8:01	0:787	15 53:6	15 40:3
Sat.	2	7 52 13:0	54:82	0 27:03	0:798	15 53:8	16 35:7
Sun.	3	7 30 13:4	55:14	0 46:31	0:808	15 54:0	17 30:8
Mon.	4	7 8 6:5	55:44	1 5:82	0:818	15 54:3	18 24:8
Tues.	5	6 45 52:4	55:73	1 25:56	0:827	15 54:5	19 17:0
Wed.	6	6 23 31:6	56:00	1 45:50	0:835	15 54:7	20 6:9
Thur.	7	6 1 4:4	56:26	2 5:63	0:842	15 55:0	20 54:5
Frid.	8	5 38 31:1	56:51	2 25:94	0:849	15 55:2	21 39:8
Sat.	9	5 15 52:1	56:74	2 46:40	0:856	15 55:5	22 23:3
Sun.	10	4 53 7:7	56:95	3 7:01	0:861	15 55:7	23 5:6
Mon.	11	4 30 18:3	57:16	3 27:74	0:866	15 55:9	23 47:1
Tues.	12	4 7 24:2	57:35	3 48:58	0:870	15 56:2	* 4:1
Wed.	13	3 44 25:7	57:52	4 9:52	0:874	15 56:5	0 28:7
Thur.	14	3 21 23:2	57:68	4 30:53	0:876	15 56:7	1 10:8
Frid.	15	2 58 17:1	57:82	4 51:59	0:879	15 57:0	1 54:2
Sat.	16	2 35 7:7	57:95	5 12:70	0:880	15 57:2	2 39:3
Sun.	17	2 11 55:3	58:07	5 33:83	0:881	15 57:5	3 26:6
Mon.	18	1 48 40:2	58:17	5 54:97	0:881	15 57:8	4 16:3
Tues.	19	1 25 22:9	58:26	6 16:10	0:880	15 58:1	5 8:1
Wed.	20	1 2 3:7	58:34	6 37:19	0:878	15 58:3	6 1:8
Thur.	21	0 38 42:8	58:40	6 58:23	0:875	15 58:6	6 56:6
Frid.	22	N 0 15 20:7	58:44	7 19:20	0:872	15 58:9	7 51:9
Sat.	23	0 8 2:3	58:47	7 40:09	0:868	15 59:1	8 47:1
Sun.	24	0 31 25:9	58:49	8 0:87	0:863	15 59:4	9 42:2
Mon.	25	0 54 49:7	58:49	8 21:52	0:857	15 59:7	10 37:2
Tues.	26	1 18 13:5	58:49	8 42:01	0:850	16 0:0	11 32:5
Wed.	27	1 41 37:0	58:46	9 2:31	0:841	16 0:2	12 28:1
Thur.	28	2 4 59:8	58:43	9 22:40	0:832	16 0:5	13 25:2
Frid.	29	2 28 21:6	58:38	9 42:25	0:822	16 0:8	14 22:6
Sat.	30	2 51 42:1	58:32	10 1:84	0:810	16 1:1	15 19:9

PHASES OF THE MOON.

h	m	September 4	September 12	September 26
11	26	Last Quarter	New Moon	Apogee
0	58	First Quarter	Full Moon	Perigee
1	27			
17	9			

OCTOBER, 1882.

Day of the Week.	Day of the Month.	AT APPARENT NOON THE SUN'S		Equation of Time to be subd. from Apparent Time.	Var. in One Hour.	Semi-diameter.	THE MOON'S Meridian Passage.
		Apparent Declination.	Var. in 1 hour.				
Sun.	1	S 3 15 0:9	58:24	10 21:14	0:798	16 1:3	16 16:2
Mon.	2	3 38 17:7	58:15	10 40:13	0:784	16 1:6	17 10:6
Tues.	3	4 1 32:2	58:05	10 58:79	0:770	16 1:9	18 2:4
Wed.	4	4 24 43:9	57:93	11 17:10	0:755	16 2:1	18 51:3
Thur.	5	4 47 52:6	57:79	11 35:03	0:739	16 2:4	19 37:6
Frid.	6	5 10 57:8	57:64	11 52:58	0:723	16 2:7	20 21:7
Sat.	7	5 33 59:1	57:47	12 9:73	0:706	16 3:0	21 4:2
Sun.	8	5 56 56:2	57:28	12 26:45	0:687	16 3:2	21 45:9
Mon.	9	6 19 48:6	57:08	12 42:72	0:669	16 3:5	22 27:4
Tues.	10	6 42 36:1	56:87	12 58:54	0:649	16 3:8	23 9:5
Wed.	11	7 5 18:2	56:63	13 13:88	0:629	16 4:1	23 52:7
Thur.	12	7 27 54:5	56:39	13 28:73	0:608	16 4:3	*
Frid.	13	7 50 24:7	56:12	13 43:07	0:587	16 4:6	0 37:6
Sat.	14	8 12 48:4	55:84	13 56:89	0:564	16 4:9	1 24:5
Sun.	15	8 35 5:1	55:54	14 10:16	0:541	16 5:2	2 13:5
Mon.	16	8 57 14:5	55:23	14 22:88	0:518	16 5:4	3 4:5
Tues.	17	9 19 16:2	54:90	14 35:03	0:494	16 5:7	3 57:0
Wed.	18	9 41 9:7	54:55	14 46:60	0:470	16 6:0	4 50:2
Thur.	19	10 2 54:7	54:19	14 57:57	0:444	16 6:3	5 43:7
Frid.	20	10 24 30:9	53:81	15 7:93	0:419	16 6:5	6 36:9
Sat.	21	10 45 57:7	53:41	15 17:67	0:393	16 6:8	7 29:9
Sun.	22	11 7 14:8	53:00	15 26:77	0:366	16 7:1	8 22:8
Mon.	23	11 28 21:8	52:57	15 35:22	0:338	16 7:4	9 16:2
Tues.	24	11 49 18:4	52:13	15 42:99	0:309	16 7:6	10 10:6
Wed.	25	12 10 4:1	51:67	15 50:06	0:280	16 7:9	11 6:4
Thur.	26	12 30 38:6	51:20	15 56:42	0:250	16 8:1	12 3:8
Frid.	27	12 51 1:6	50:71	16 2:04	0:219	16 8:4	13 2:3
Sat.	28	13 11 12:6	50:20	16 6:91	0:187	16 8:7	14 0:8
Sun.	29	13 51 11:3	49:68	16 11:01	0:155	16 8:9	14 57:9
Mon.	30	13 30 57:2	49:14	16 14:33	0:122	16 9:2	15 52:6
Tues.	31	14 10 30:0	48:58	16 16:85	0:088	16 9:4	16 44:1

PHASES OF THE MOON.

h	m	October 3	October 9
14	17	Last Quarter	Apogee
18	14	New Moon	Perigee
11	54	First Quarter	
2	33	Full Moon	

NOVEMBER, 1882.

Day of the Week.	Day of the Month.	AT APPARENT NOON THE SUN'S		Equation of Time to be subtr. from		Var. in One Hour.	Semi-diameter.	THE MOON'S Meridian Passage.	
		Apparent Declination.	Var. in hour.	Apparent Time.	s			h	m
Wed.	1	S 14 29 49.2	48°01'	16 18 56	0.054	16 9.7	17 32.4	h m	h m
Thur.	2	14 48 54.4	47°42'	16 19 45	0.020	16 9.9	18 17.9	6 57.9	18
Frid.	3	15 7 45.3	46°81'	16 19 52	0.014	16 10.1	19 1.3	11 19.6	19
Sat.	4	15 26 21.4	46°19'	16 18 76	0.049	16 10.4	19 43.3	20 41.5	20
Sun.	5	15 44 42.2	45°54'	16 17 15	0.085	16 10.6	20 24.8	14 2.5	21
Mon.	6	16 2 47.4	44°88'	16 14 70	0.120	16 10.8	21 6.6		
Tues.	7	16 20 36.6	44°21'	16 11 41	0.155	16 11.1	21 49.4		
Wed.	8	16 38 9.4	43°51'	16 7 26	0.191	16 11.3	22 33.9		
Thur.	9	16 55 25.2	42°80'	16 2 25	0.226	16 11.5	23 20.5		
Frid.	10	17 12 23.8	42°07'	15 56 39	0.262	16 11.8	*		
Sat.	11	17 29 4.6	41 32	15 49 67	0.298	16 12.0	0 9.5		
Sun.	12	17 45 27.4	40 56	15 42 11	0.333	16 12.2	1 0.6		
Mon.	13	18 1 31.7	39 79	15 33 70	0.368	16 12.4	1 53.3		
Tues.	14	18 17 17.1	38 99	15 24 45	0.403	16 12.7	2 46.8		
Wed.	15	18 32 43.1	38 18	15 14 37	0.437	16 12.9	3 40.2		
Thur.	16	18 47 49.5	37 35	15 3 46	0.471	16 13.1	4 33.0		
Frid.	17	19 2 35.7	36 50	14 51 74	0.505	16 13.3	5 24.9		
Sat.	18	19 17 1.5	35 64	14 39 21	0.539	16 13.5	6 16.2		
Sun.	19	19 31 6.4	34 76	14 25 87	0.572	16 13.7	7 7.4		
Mon.	20	19 44 50.0	33 87	14 11 74	0.605	15 13.9	7 59.2		
Tues.	21	19 58 12.1	32 96	13 56 82	0.638	16 14.1	8 52.3		
Wed.	22	20 11 12.2	32 04	13 41 12	0.670	16 14.3	9 47.4		
Thur.	23	20 23 50.0	31 10	13 24 64	0.703	16 14.5	10 44.3		
Frid.	24	20 36 5.2	30 16	13 7 39	0.735	16 14.7	11 42.5		
Sat.	25	20 47 57.5	29 19	12 49 37	0.766	16 14.8	12 40.8		
Sun.	26	20 59 26.4	28 21	12 30 60	0.797	16 15.0	13 37.7		
Mon.	27	21 10 31.7	27 22	12 11 09	0.828	16 15.2	14 32.0		
Tues.	28	21 21 13.2	26 22	11 50 85	0.858	16 15.3	15 23.0		
Wed.	29	21 31 30.4	25 20	11 29 89	0.887	16 15.5	16 10.8		
Thur.	30	21 41 23.0	24 17	11 8 24	0.916	16 15.7	16 55.8		

PHASES OF THE MOON.

h	m	h	m
November 2	10	November 5	21
November 10	17	November 21	18
November 17	24	Apogee	19
November 24		Perigee	

DECEMBER, 1882.

Day of the Week.	Day of the Month.	AT APPARENT NOON THE SUN'S		Equation of Time to be subtr. from		Var. in One Hour.	Semi-diameter.	THE MOON'S Meridian Passage.	
		Apparent Declination.	Var. in hour.	Apparent Time.	s			h	m
Frid.	1	S 21 50 50.8	23°13'	10 45 92	0.944	16 15.8	17 38.9	h m	h m
Sat.	2	21 59 53.4	22 08	10 22 94	0.971	16 15.9	18 20.7	2 56.4	13
Sun.	3	22 8 30.7	21 02	9 59 33	0.997	16 16.1	19 2.3	3 37.6	14
Mon.	4	22 16 42.2	19 94	9 35 10	1.022	16 16.2	19 44.5	4 39.3	15
Tues.	5	22 24 27.8	18 85	9 10 28	1.046	16 16.3	20 28.0	5 41.1	16
Wed.	6	22 31 47.1	17 75	8 44 90	1.069	16 16.5	21 13.7		
Thur.	7	22 38 40.0	16 65	8 18 98	1.090	16 16.6	22 1.8		
Frid.	8	22 45 6.3	15 54	7 52 56	1.111	16 16.7	22 52.6		
Sat.	9	22 51 5.7	14 41	7 25 67	1.130	16 16.8	23 45.6		
Sun.	10	22 56 38.1	13 28	6 58 33	1.148	16 16.9	*		
Mon.	11	23 1 43.2	12 14	6 30 59	1.164	16 17.0	0 40.1		
Tues.	12	23 6 20.9	11 00	6 2 47	1.179	16 17.1	1 34.9		
Wed.	13	23 10 31.2	9 85	5 34 02	1.191	16 17.2	2 29.0		
Thur.	14	23 14 13.7	8 69	5 5 28	1.203	16 17.3	3 23.0		
Frid.	15	23 17 28.3	7 53	4 36 27	1.213	16 17.4	4 13.8		
Sat.	16	23 20 15.1	6 36	4 7 04	1.222	16 17.5	5 4.6		
Sun.	17	23 22 33.8	5 19	3 37 62	1.229	16 17.6	5 55.3		
Mon.	18	23 24 24.4	4 02	3 8 05	1.235	16 17.7	6 46.6		
Tues.	19	23 25 46.8	2 85	2 38 35	1.240	16 17.8	7 39.1		
Wed.	20	23 26 41.0	1 67	2 8 55	1.243	16 17.8	8 33.4		
Thur.	21	23 27 6.9	0 49	1 38 70	1.245	16 17.9	9 29.4		
Frid.	22	23 27 4.5	0 69	1 8 81	1.245	16 18.0	10 26.3		
Sat.	23	23 26 33.8	1 87	0 38 92	1.245	16 18.0	11 23.2		
Sun.	24	23 25 34.9	3 04	0 9 06	1.243	16 18.1	12 18.5		
Mon.	25	23 24 7.7	4 22	0 20 74	1.240	16 18.1	13 11.4		
Tues.	26	23 22 12.2	5 40	0 50 46	1.236	16 18.1	14 1.3		
Wed.	27	23 19 48.6	6 57	1 20 05	1.230	16 18.2	14 48.2		
Thur.	28	23 16 56.8	7 74	1 49 48	1.223	16 18.2	15 32.7		
Frid.	29	23 13 36.9	8 91	2 18 74	1.215	16 18.2	16 15.5		
Sat.	30	23 9 49.1	10 07	2 47 78	1.205	16 18.2	16 57.4		
Sun.	31	23 5 33.5	11 23	3 16 58	1.194	16 18.2	17 39.2		

PHASES OF THE MOON.

h	m	h	m
December 2	10	December 3	18
December 10	17	December 31	10
December 17	24	Apogee	13
December 24		Perigee	17

1883.

1883.

General Library

JANUARY, 1883.

Day of the Week.	Day of the Month.	AT APPARENT NOON THE SUN'S				Equation of Time to be added to		Semi-diameter.	THE MOON'S Meridian Passage.								
		Apparent Declination.		Var. in hour.	Apparent Time.		Var. in One Hour.		Meridian Passage.								
		°	'		m	s			'	"	h	m					
Mon.	1	S 23	0	50	0	12	39	3	45	10	1.182	16	18	2	18	21	8
Tues.	2	22	55	38	9	13	53	4	13	32	1.169	16	18	2	19	6	0
Wed.	3	22	50	0	4	14	67	4	41	20	1.154	16	18	2	19	52	4
Thur.	4	22	43	54	6	15	81	5	8	72	1.139	16	18	2	20	41	5
Frid.	5	22	37	21	7	16	93	5	35	85	1.121	16	18	1	21	33	4
Sat.	6	22	30	21	9	18	05	6	2	55	1.103	16	18	1	22	27	5
Sun.	7	22	22	55	4	19	16	6	28	80	1.083	16	18	1	23	23	0
Mon.	8	22	15	2	4	20	25	6	54	55	1.062	16	18	1	*	*	*
Tues.	9	22	6	43	3	21	34	7	19	78	1.040	16	18	0	0	18	8
Wed.	10	21	57	58	2	22	41	7	44	46	1.016	16	18	0	1	14	0
Thur.	11	21	48	47	4	23	48	8	8	56	0.991	16	17	9	2	7	9
Frid.	12	21	39	11	3	24	53	8	32	05	0.965	16	17	9	3	0	6
Sat.	13	21	29	10	1	25	57	8	54	90	0.939	16	17	8	3	52	5
Sun.	14	21	18	4	0	26	60	9	17	10	0.911	16	17	8	4	44	2
Mon.	15	21	7	53	3	27	61	9	38	61	0.882	16	17	7	5	36	3
Tues.	16	20	56	38	5	28	61	9	59	42	0.852	16	17	6	6	29	5
Wed.	17	20	44	59	8	29	60	10	19	52	0.823	16	17	6	7	23	8
Thur.	18	20	32	57	5	30	58	10	38	90	0.792	16	17	5	8	19	1
Frid.	19	20	20	31	9	31	54	10	57	53	0.760	16	17	4	9	14	6
Sat.	20	20	7	43	5	32	49	11	15	40	0.729	16	17	3	10	9	3
Sun.	21	19	54	32	5	33	42	11	32	51	0.697	16	17	2	11	2	3
Mon.	22	19	40	59	2	34	34	11	48	85	0.665	16	17	1	11	52	9
Tues.	23	19	27	4	0	35	25	12	4	41	0.632	16	17	0	12	40	9
Wed.	24	19	12	47	3	36	14	12	19	18	0.599	16	16	9	13	26	5
Thur.	25	18	58	9	5	37	01	12	33	16	0.566	16	16	8	14	10	3
Frid.	26	18	43	10	9	37	87	12	46	34	0.533	16	16	7	14	52	7
Sat.	27	18	27	51	8	38	71	12	58	72	0.499	16	16	5	15	34	7
Sun.	28	18	12	12	6	39	54	13	10	31	0.466	16	16	4	16	16	9
Mon.	29	17	56	13	7	40	36	13	21	09	0.433	16	16	3	17	0	0
Tues.	30	17	39	55	1	41	15	13	31	07	0.399	16	16	1	17	44	8
Wed.	31	17	23	18	4	41	93	13	40	25	0.366	16	16	0	18	31	8

PHASES OF THE MOON.

h	m	h	m
0	50	2	17
17	59	3	17
12	47	6	12
19	15	5	19
22	26	6	22
1	50	2	17
8	59	3	17
15	47	6	12
22	15	5	19
30	26	6	22
12	44	2	12
28	59	3	28
12	44	2	12
28	59	3	28

FEBRUARY, 1883.

Day of the Week.	Day of the Month.	AT APPARENT NOON THE SUN'S				Equation of Time to be added to		Semi-diameter.	THE MOON'S Meridian Passage.								
		Apparent Declination.		Var. in hour.	Apparent Time.		Var. in One Hour.		Meridian Passage.								
		°	'		m	s			'	"	h	m					
Thur.	1	S 17	6	22	8	42	69	13	48	63	0.333	16	15	8	19	21	3
Frid.	2	16	49	9	1	43	44	13	56	21	0.299	16	15	7	20	13	3
Sat.	3	16	31	37	7	44	17	14	2	98	0.266	16	15	5	21	7	4
Sun.	4	16	13	49	0	44	88	14	8	96	0.232	16	15	3	22	2	8
Mon.	5	15	55	43	5	45	57	14	14	13	0.199	16	15	2	22	58	7
Tues.	6	15	37	21	6	46	24	14	18	50	0.165	16	15	0	23	54	2
Wed.	7	15	18	43	8	46	90	14	22	07	0.132	16	14	8	*	*	*
Thur.	8	14	59	50	5	47	54	14	24	84	0.099	16	14	7	0	49	1
Frid.	9	14	40	42	0	48	16	14	26	80	0.065	16	14	5	1	43	2
Sat.	10	14	21	19	0	48	76	14	27	96	0.032	16	14	3	2	36	9
Sun.	11	14	1	41	7	49	34	14	28	34	0.001	16	14	1	3	30	8
Mon.	12	13	41	50	6	49	91	14	27	93	0.033	16	13	9	4	25	1
Tues.	13	13	21	46	1	50	46	14	26	74	0.066	16	13	8	5	20	1
Wed.	14	13	1	28	7	50	99	14	24	78	0.097	16	13	6	6	15	4
Thur.	15	12	40	58	7	51	50	14	22	07	0.129	16	13	4	7	10	7
Frid.	16	12	20	16	6	52	00	14	18	61	0.159	16	13	2	8	5	0
Sat.	17	11	59	22	8	52	48	14	14	42	0.189	16	13	0	8	57	7
Sun.	18	11	38	17	7	52	94	14	9	52	0.219	16	12	8	9	48	3
Mon.	19	11	17	1	7	53	39	14	3	91	0.248	16	12	6	10	36	5
Tues.	20	10	55	35	1	53	82	13	57	62	0.276	16	12	3	11	22	4
Wed.	21	10	33	58	5	54	23	13	50	66	0.304	16	12	1	12	6	6
Thur.	22	10	12	12	1	54	63	13	43	05	0.330	16	11	9	12	49	4
Frid.	23	9	50	16	3	55	01	13	34	82	0.356	16	11	7	13	31	6
Sat.	24	9	28	11	6	55	37	13	25	97	0.381	16	11	4	14	13	7
Sun.	25	9	5	58	4	55	72	13	16	53	0.405	16	11	2	14	56	4
Mon.	26	8	43	36	9	56	06	13	6	53	0.428	16	11	0	15	40	3
Tues.	27	8	21	7	6	56	38	12	55	97	0.451	16	10	7	16	25	9
Wed.	28	7	58	30	9	56	68	12	44	89	0.472	16	10	5	17	13	4

PHASES OF THE MOON.

h	m	h	m
6	10	1	6
21	55	0	21
12	18	1	12
1	50	2	1
8	59	3	8
15	47	6	15
22	15	5	22
30	26	6	30
12	44	2	12
28	59	3	28
12	44	2	12
28	59	3	28

MAY, 1883.

Day of the Week.	Day of the Month.	AT APPARENT NOON THE SUN'S		Equation of Time to be subtr. from added to Apparent Time.	Var. in One Hour.	Semi-diameter.	THE MOON'S Meridian Passage.	
		Apparent Declination.	Var. in hour.				h	m
Tues.	1	N15 3 21.7	45.42	3 0.29	0.315	15 54.1	19 51.6	
Wed.	2	15 21 24.3	44.79	3 7.58	0.292	15 53.8	20 44.0	
Thur.	3	15 39 11.8	44.16	3 14.31	0.268	15 53.6	21 38.0	
Frid.	4	15 56 43.8	43.50	3 20.46	0.245	15 53.4	22 34.0	
Sat.	5	16 14 0.0	42.84	3 26.05	0.221	15 53.1	23 32.1	
Sun.	6	16 31 0.0	42.16	3 31.06	0.197	15 52.9	*	
Mon.	7	16 47 43.7	41.47	3 35.51	0.174	15 52.7	0 32.0	
Tues.	8	17 4 10.6	40.76	3 39.39	0.150	15 52.5	1 32.4	
Wed.	9	17 20 20.4	40.05	3 42.70	0.126	15 52.3	2 31.8	
Thur.	10	17 36 12.9	39.32	3 45.45	0.103	15 52.1	3 28.8	
Frid.	11	17 51 47.7	38.58	3 47.64	0.080	15 51.8	4 22.4	
Sat.	12	18 7 4.5	37.82	3 49.27	0.056	15 51.6	5 12.4	
Sun.	13	18 22 3.1	37.05	3 50.35	0.034	15 51.4	5 59.3	
Mon.	14	18 36 43.1	36.27	3 50.88	0.011	15 51.3	6 43.8	
Tues.	15	18 51 4.3	35.49	3 50.86	0.012	15 51.1	7 26.6	
Wed.	16	19 5 6.4	34.68	3 50.29	0.035	15 50.9	8 8.6	
Thur.	17	19 18 49.0	33.87	3 49.16	0.058	15 50.7	8 50.7	
Frid.	18	19 32 12.0	33.05	3 47.49	0.081	15 50.5	9 33.5	
Sat.	19	19 45 15.2	32.21	3 45.27	0.104	15 50.3	10 17.7	
Sun.	20	19 57 58.2	31.37	3 42.51	0.126	15 50.1	11 3.6	
Mon.	21	20 10 20.8	30.51	3 39.21	0.149	15 50.0	11 51.4	
Tues.	22	20 22 22.8	29.65	3 35.37	0.171	15 49.8	12 40.9	
Wed.	23	20 34 3.9	28.77	3 31.01	0.193	15 49.6	13 31.7	
Thur.	24	20 45 23.9	27.89	3 26.11	0.215	15 49.4	14 23.2	
Frid.	25	20 56 22.6	27.00	3 20.69	0.236	15 49.3	15 14.7	
Sat.	26	21 6 59.7	26.09	3 14.76	0.257	15 49.1	16 5.8	
Sun.	27	21 17 15.0	25.18	3 8.33	0.278	15 48.9	16 56.3	
Mon.	28	21 27 8.3	24.26	3 1.41	0.298	15 48.8	17 46.5	
Tues.	29	21 36 39.4	23.33	2 54.01	0.318	15 48.6	18 37.0	
Wed.	30	21 45 48.0	22.39	2 46.14	0.337	15 48.5	19 28.4	
Thur.	31	21 54 34.0	21.44	2 37.81	0.356	15 48.3	20 21.5	

PHASES OF THE MOON.

h	m	h	m
9	58.3	..	..
10	54.2	..	..
15	11.6	..	..
2	22.7	..	..
May 6	13	May 5	17
"	21	"	17
"	20	"	17
"	20	"	17

JUNE, 1883.

Day of the Week.	Day of the Month.	AT APPARENT NOON THE SUN'S		Equation of Time to be subtr. from added to Apparent Time.	Var. in One Hour.	Semi-diameter.	THE MOON'S Meridian Passage.	
		Apparent Declination.	Var. in hour.				h	m
Frid.	1	N22 2 57.1	20.49	2 29.04	0.374	15 48.2	21 16.8	
Sat.	2	22 10 57.3	19.52	2 19.85	0.391	15 48.1	22 14.5	
Sun.	3	22 18 34.2	18.55	2 10.25	0.408	15 47.9	23 14.0	
Mon.	4	22 25 47.8	17.58	2 0.27	0.423	15 47.8	*	
Tues.	5	22 32 37.9	16.60	1 49.93	0.438	15 47.7	0 14.0	
Wed.	6	22 39 4.4	15.61	1 39.25	0.451	15 47.5	1 12.9	
Thur.	7	22 45 7.1	14.61	1 28.27	0.463	15 47.4	2 9.2	
Frid.	8	22 50 45.8	13.61	1 17.01	0.475	15 47.3	3 2.1	
Sat.	9	22 56 0.5	12.61	1 5.49	0.485	15 47.2	3 51.6	
Sun.	10	23 0 51.0	11.60	0 53.74	0.494	15 47.1	4 38.1	
Mon.	11	23 5 17.3	10.59	0 41.77	0.502	15 47.0	5 22.3	
Tues.	12	23 9 19.1	9.57	0 29.62	0.510	15 46.9	6 5.1	
Wed.	13	23 12 56.5	8.55	0 17.29	0.517	15 46.9	6 47.3	
Thur.	14	23 16 9.3	7.52	0 4.82	0.522	15 46.8	7 29.8	
Frid.	15	23 18 57.5	6.49	0 7.78	0.527	15 46.7	8 13.4	
Sat.	16	23 21 21.0	5.46	0 20.48	0.531	15 46.6	8 58.5	
Sun.	17	23 23 19.8	4.44	0 33.27	0.534	15 46.6	9 45.6	
Mon.	18	23 24 53.9	3.40	0 46.13	0.537	15 46.5	10 34.7	
Tues.	19	23 26 3.2	2.37	0 59.03	0.538	15 46.4	11 25.6	
Wed.	20	23 26 47.7	1.34	1 11.95	0.539	15 46.4	12 17.7	
Thur.	21	23 27 7.4	0.31	1 24.88	0.539	15 46.3	13 10.2	
Frid.	22	23 27 2.4	0.73	1 37.80	0.537	15 46.3	14 2.3	
Sat.	23	23 26 32.5	1.76	1 50.67	0.535	15 46.2	14 53.7	
Sun.	24	23 25 37.9	2.79	2 3.49	0.532	15 46.2	15 44.4	
Mon.	25	23 24 18.4	3.83	2 16.22	0.529	15 46.1	16 34.6	
Tues.	26	23 22 34.2	4.86	2 28.86	0.524	15 46.1	17 25.1	
Wed.	27	23 20 25.3	5.89	2 41.38	0.519	15 46.1	18 16.4	
Thur.	28	23 17 51.7	6.91	2 53.77	0.513	15 46.0	19 9.4	
Frid.	29	23 14 53.5	7.93	3 5.99	0.505	15 46.0	20 4.1	
Sat.	30	23 11 30.9	8.95	3 18.03	0.497	15 46.0	21 1.4	

PHASES OF THE MOON.

h	m	h	m
18	12.5	..	..
9	41.6	..	..
4	31.6	..	..
7	37.8	..	..
June 4	12	June 2	14
"	20	"	14
"	27	"	29
"	27	"	29

JULY, 1883.

Day of the Week.	Day of the Month.	AT APPARENT NOON THE SUN'S		Equation of Time to be added to Apparent Time.	Var. in One Hour.	Semi-diameter.	THE MOON'S Meridian Passage.
		Apparent Declination.	Var. in Hour.				
<i>Sun.</i>	1	N23 7 43.8	9.97	3 29.87	0.489	15 46.0	21 59.7
<i>Mon.</i>	2	23 3 32.5	10.98	3 41.48	0.478	15 46.0	22 58.2
<i>Tues.</i>	3	22 58 57.0	11.98	3 52.82	0.467	15 46.0	23 55.3
<i>Wed.</i>	4	22 53 57.4	12.98	4 3.88	0.454	15 46.0	* * *
<i>Thur.</i>	5	22 48 34.0	13.97	4 14.62	0.441	15 46.0	0 50.0
<i>Frid.</i>	6	22 42 46.8	14.96	4 25.03	0.426	15 46.0	1 41.5
<i>Sat.</i>	7	22 36 35.9	15.94	4 35.07	0.410	15 46.0	2 30.0
<i>Sun.</i>	8	22 30 1.6	16.91	4 44.73	0.394	15 46.0	3 15.9
<i>Mon.</i>	9	22 23 4.0	17.88	4 53.98	0.376	15 46.1	3 59.9
<i>Tues.</i>	10	22 15 43.2	18.85	5 2.80	0.359	15 46.1	4 42.7
<i>Wed.</i>	11	22 7 59.4	19.80	5 11.19	0.340	15 46.1	5 25.3
<i>Thur.</i>	12	21 59 52.8	20.75	5 19.12	0.320	15 46.2	6 8.4
<i>Frid.</i>	13	21 51 23.6	21.68	5 26.57	0.300	15 46.2	6 52.6
<i>Sat.</i>	14	21 42 32.0	22.61	5 33.54	0.280	15 46.3	7 38.6
<i>Sun.</i>	15	21 33 18.2	23.53	5 40.01	0.259	15 46.3	8 26.5
<i>Mon.</i>	16	21 23 42.4	24.44	5 45.97	0.237	15 46.4	9 16.6
<i>Tues.</i>	17	21 13 41.8	25.35	5 51.40	0.215	15 46.5	10 8.4
<i>Wed.</i>	18	21 3 25.6	26.25	5 56.31	0.193	15 46.5	11 1.2
<i>Thur.</i>	19	20 52 45.0	27.13	6 0.67	0.170	15 46.6	11 54.1
<i>Frid.</i>	20	20 41 43.3	28.00	6 4.43	0.147	15 46.7	12 47.3
<i>Sat.</i>	21	20 30 20.8	28.87	6 7.74	0.124	15 46.8	13 39.5
<i>Sun.</i>	22	20 18 37.5	29.73	6 10.41	0.101	15 46.8	14 31.0
<i>Mon.</i>	23	20 6 33.8	30.58	6 12.58	0.078	15 46.9	15 22.3
<i>Tues.</i>	24	19 54 9.8	31.42	6 14.16	0.054	15 47.0	16 13.9
<i>Wed.</i>	25	19 41 25.8	32.24	6 15.17	0.030	15 47.1	17 6.4
<i>Thur.</i>	26	19 28 22.1	33.06	6 15.61	0.006	15 47.2	18 0.3
<i>Frid.</i>	27	19 14 59.0	33.86	6 15.48	0.017	15 47.3	18 55.6
<i>Sat.</i>	28	19 1 16.6	34.66	6 14.78	0.041	15 47.4	19 52.2
<i>Sun.</i>	29	18 47 15.4	35.44	6 13.51	0.065	15 47.5	20 49.2
<i>Mon.</i>	30	18 32 55.5	36.21	6 11.65	0.090	15 47.6	21 45.6
<i>Tues.</i>	31	18 18 17.3	36.96	6 9.20	0.115	15 47.7	22 40.2

PHASES OF THE MOON.

h	m
3	35
19	49.3
15	30.9
12	13.4

New Moon ..
 First Quarter ..
 Full Moon ..
 Last Quarter ..

July 4 ..
 " 11 ..
 " 19 ..
 " 26 ..

July 12 ..
 " 25 ..

AUGUST, 1883.

<i>Wed.</i>	1	N18 3 21.2	37.71	6 6.15	0.139	15 47.8	23 32.4
<i>Thur.</i>	2	17 48 7.3	38.44	6 2.51	0.164	15 48.0	* * *
<i>Frid.</i>	3	17 32 36.1	39.16	5 58.27	0.190	15 48.1	0 21.9
<i>Sat.</i>	4	17 16 47.8	39.86	5 53.41	0.215	15 48.2	1 9.0
<i>Sun.</i>	5	17 0 42.6	40.56	5 47.95	0.240	15 48.4	1 54.0
<i>Mon.</i>	6	16 44 21.0	41.24	5 41.88	0.265	15 48.5	2 37.6
<i>Tues.</i>	7	16 27 43.3	41.90	5 35.21	0.291	15 48.7	3 20.5
<i>Wed.</i>	8	16 10 49.6	42.56	5 27.93	0.316	15 48.8	4 3.5
<i>Thur.</i>	9	15 53 40.4	43.20	5 20.05	0.341	15 49.0	4 47.1
<i>Frid.</i>	10	15 36 15.9	43.83	5 11.58	0.365	15 49.1	5 32.0
<i>Sat.</i>	11	15 18 36.5	44.44	5 2.53	0.389	15 49.3	6 18.6
<i>Sun.</i>	12	15 0 42.5	45.05	4 52.89	0.414	15 49.5	7 7.0
<i>Mon.</i>	13	14 42 34.1	45.64	4 42.68	0.437	15 49.6	7 57.4
<i>Tues.</i>	14	14 24 11.8	46.22	4 31.90	0.461	15 49.8	8 49.2
<i>Wed.</i>	15	14 5 35.7	46.78	4 20.57	0.483	15 50.0	9 42.1
<i>Thur.</i>	16	13 46 46.3	47.33	4 8.70	0.506	15 50.2	10 35.4
<i>Frid.</i>	17	13 27 43.7	47.87	3 56.30	0.528	15 50.4	11 28.7
<i>Sat.</i>	18	13 8 28.3	48.40	3 43.38	0.549	15 50.6	12 21.7
<i>Sun.</i>	19	12 49 0.5	48.91	3 29.95	0.570	15 50.7	13 14.6
<i>Mon.</i>	20	12 29 20.4	49.42	3 16.04	0.589	15 50.9	14 7.7
<i>Tues.</i>	21	12 9 28.3	49.91	3 1.66	0.609	15 51.1	15 1.4
<i>Wed.</i>	22	11 49 24.6	50.39	2 45.83	0.627	15 51.3	15 56.0
<i>Thur.</i>	23	11 29 9.5	50.86	2 31.57	0.644	15 51.5	16 51.7
<i>Frid.</i>	24	11 8 43.4	51.31	2 15.90	0.661	15 51.7	17 48.2
<i>Sat.</i>	25	10 48 6.6	51.75	1 59.82	0.678	15 51.9	18 44.8
<i>Sun.</i>	26	10 27 19.4	52.13	1 43.36	0.694	15 52.1	19 40.7
<i>Mon.</i>	27	10 6 22.2	52.50	1 26.53	0.709	15 52.3	20 34.9
<i>Tues.</i>	28	9 45 15.2	52.99	1 9.33	0.724	15 52.6	21 27.0
<i>Wed.</i>	29	9 23 58.9	53.37	0 51.79	0.738	15 52.8	22 16.6
<i>Thur.</i>	30	9 2 33.6	53.74	0 33.90	0.752	15 53.0	23 3.9
<i>Frid.</i>	31	8 40 59.6	54.09	0 15.69	0.765	15 53.2	23 49.3

PHASES OF THE MOON.

h	m
13	26.2
13	29.3
0	53.9
17	31.9

New Moon ..
 First Quarter ..
 Full Moon ..
 Last Quarter ..

August 2 ..
 " 10 ..
 " 18 ..
 " 24 ..

August 8 ..
 " 20 ..

SEPTEMBER, 1883.

Day of the Week.	Day of the Month.	AT APPARENT NOON THE SUN'S		Equation of Time to be subt. from		Semi-diameter.	THE MOON'S Meridian Passage.	
		Apparent Declination.	Var. in hour.	Apparent Time.			h	m
				m	s			
Sat.	1	N 8 19 17.2	54.43	0 2' 84	0.778	15 53.4	*	*
Sun.	2	7 57 26.8	54.76	0 21.66	0.790	15 53.7	0	33.3
Mon.	3	7 35 28.7	55.07	0 40.77	0.802	15 53.9	1	16.5
Tues.	4	7 13 23.3	55.37	1 0 15	0.813	15 54.1	1	59.5
Wed.	5	6 51 10.9	55.66	1 19.77	0.823	15 54.4	2	42.3
Thur.	6	6 28 51.8	55.93	1 39.64	0.832	15 54.6	3	27.1
Frid.	7	6 6 26.4	56.19	1 59.73	0.841	15 54.9	4	12.6
Sat.	8	5 43 51.9	56.43	2 20.03	0.850	15 55.1	4	59.6
Sun.	9	5 21 17.7	56.66	2 40.52	0.857	15 55.4	5	43.2
Mon.	10	4 58 35.2	56.88	3 1 18	0.864	15 55.6	6	38.3
Tues.	11	4 35 47.7	57.08	3 21.98	0.870	15 55.9	7	29.5
Wed.	12	4 12 55.6	57.26	3 42.92	0.875	15 56.2	8	21.6
Thur.	13	3 49 59.1	57.44	4 3 98	0.879	15 56.4	9	14.2
Frid.	14	3 26 58.5	57.60	4 25.13	0.883	15 56.7	10	7.1
Sat.	15	3 3 54.2	57.75	4 46.35	0.885	15 56.9	11	0.4
Sun.	16	2 40 46.5	57.89	5 7.62	0.887	15 57.2	11	54.4
Mon.	17	2 17 35.7	58.01	5 28.92	0.887	15 57.5	12	49.3
Tues.	18	1 54 22.0	58.12	5 50.21	0.886	15 57.7	13	45.4
Wed.	19	1 31 5.8	58.22	6 11.47	0.885	15 58.0	14	2.8
Thur.	20	1 7 47.4	58.30	6 32.67	0.882	15 58.3	15	40.9
Frid.	21	0 44 27.2	58.38	6 53.79	0.878	15 58.5	16	39.0
Sat.	22	0 21 5.3	58.44	7 14.81	0.873	15 58.8	17	36.2
Sun.	23	S 0 2 17.7	58.48	7 35.70	0.868	15 59.1	18	31.4
Mon.	24	0 25 41.6	58.51	7 56.45	0.861	15 59.3	19	24.1
Tues.	25	0 49 6.0	58.52	8 17.04	0.854	15 59.6	20	14.0
Wed.	26	1 12 30.5	58.52	8 37.45	0.846	15 59.9	21	1.5
Thur.	27	1 35 54.8	58.50	8 57.66	0.838	16 0 1	21	46.9
Frid.	28	1 59 18.5	58.47	9 17.66	0.829	16 0 4	22	30.8
Sat.	29	2 22 41.3	58.42	9 37.43	0.818	16 0 7	23	13.9
Sun.	30	2 46 2 8	58.36	9 56.94	0.807	16 0 9	23	56.8

PHASES OF THE MOON.

h	m	h	m
2 14.4
6 37 8
9 41 2
0 50 8
17 54 3

September 1	September 9	September 16	September 23	September 30	September 5	September 17
New Moon..	First Quarter	Full Moon	Last Quarter	New Moon..	Apogee	Perigee

OCTOBER, 1883.

Day of the Week.	Day of the Month.	AT APPARENT NOON THE SUN'S		Equation of Time to be subt. from		Semi-diameter.	THE MOON'S Meridian Passage.	
		Apparent Declination.	Var. in hour.	Apparent Time.			h	m
				m	s			
Mon.	1	S 3 9 22.6	58.28	10 16.18	0.796	16 1 2	*	*
Tues.	2	3 32 40.4	58.19	10 35.13	0.783	16 1 5	0	40.0
Wed.	3	3 55 55.7	58.08	10 53.78	0.770	16 1 8	1	23.9
Thur.	4	4 19 8.3	57.96	11 12.11	0.756	16 2 0	2	8.9
Frid.	5	4 42 17.7	57.82	11 30.09	0.742	16 2 3	2	55.2
Sat.	6	5 5 23.7	57.67	11 47.72	0.727	16 2 6	3	42.7
Sun.	7	5 23 25.7	57.50	12 4 97	0.711	16 2 9	4	31.4
Mon.	8	5 51 23.5	57.31	12 21.83	0.694	16 3 2	5	21.0
Tues.	9	6 14 16.7	57.11	12 38.23	0.676	16 3 4	6	11.2
Wed.	10	6 37 4 8	56.89	12 54.30	0.658	16 3 7	7	1.9
Thur.	11	6 59 47.6	56.66	13 9.83	0.640	16 4 0	7	53.0
Frid.	12	7 22 21.6	56.41	13 25.00	0.620	16 4 3	8	44.7
Sat.	13	7 44 55.5	56.15	13 39.63	0.599	16 4 6	9	37.5
Sun.	14	8 7 19.9	55.87	13 53.75	0.577	16 4 9	10	31.6
Mon.	15	8 29 37.4	55.58	14 7.34	0.555	16 5 1	11	27.6
Tues.	16	8 51 47.8	55.27	14 20.33	0.531	16 5 4	12	25.6
Wed.	17	9 13 50.6	54.95	14 32.84	0.507	16 5 7	13	25.3
Thur.	18	9 35 45.6	54.62	14 44.70	0.481	16 5 9	14	25.9
Frid.	19	9 57 32.3	54.26	14 55.94	0.455	16 6 2	15	25.9
Sat.	20	10 19 10.3	53.90	15 6.53	0.428	16 6 5	16	23.9
Sun.	21	10 40 39.3	53.51	15 16.46	0.400	16 6 7	17	19.0
Mon.	22	11 1 58.9	53.11	15 25.71	0.371	16 7 0	18	10.8
Tues.	23	11 23 8.7	52.69	15 34.27	0.342	16 7 3	18	59.5
Wed.	24	11 44 8.2	52.26	15 42.12	0.312	16 7 5	19	45.5
Thur.	25	12 4 57.1	51.81	15 49.26	0.282	16 7 8	20	29.7
Frid.	26	12 25 34.9	51.34	15 55.66	0.251	16 8 0	21	12.7
Sat.	27	12 46 1 2	50.85	16 1 32	0.220	16 8 3	21	55.4
Sun.	28	13 6 15.7	50.35	16 6.23	0.189	16 8 5	22	38.2
Mon.	29	13 26 17.9	49.83	16 10.37	0.156	16 8 8	23	21.8
Tues.	30	13 46 7.4	49.29	16 13.73	0.124	16 9 1	*	*
Wed.	31	14 5 43.9	48.74	16 16.32	0.091	16 9 3	0	6.5

PHASES OF THE MOON.

h	m	h	m
22 19.6
18 45.4
11 18.6
11 56.8

October 8	October 15	October 22	October 30	October 3	October 16	October 30
First Quarter	Full Moon	Last Quarter	New Moon	Apogee	Perigee	Apogee

NOVEMBER, 1883.

Day of the Week.	Day of the Month.	AT APPARENT NOON				Equation of Time to be subd. from		Semi-diameter.	THE MOON'S Meridian Passage.
		THE SUN'S				added to			
		Apparent Declination.	Var. in hour.	h	m	Var. in One Hour.	h			m
Thur.	1	S 14 25	6'7	48'16	16 18'11	0'05.8	16' 9'6	0 52'4	
Frid.	2	14 44	15'6	47'57	16 19'11	0'025	16 9'8	1 39'7	
Sat.	3	15 3	10'1	46'96	16 19'31	0'009	16 10'1	2 27'9	
Sun.	4	15 21	49'9	46'31	16 18'70	0'042	16 10'3	3 16'9	
Mon.	5	15 40	14'5	45'70	16 17'23	0'076	16 10'5	4 6'1	
Tues.	6	15 58	23'5	45'04	16 15'06	0'110	16 10'8	4 55'4	
Wed.	7	16 16	16'4	44'36	16 12'02	0'144	16 11'0	5 44'8	
Thur.	8	16 33	53'0	43'67	16 8'16	0'178	16 11'3	6 34'3	
Frid.	9	16 51	12'6	42'96	16 3'48	0'212	16 11'5	7 24'5	
Sat.	10	17 8	15'0	42'23	15 57'98	0'246	16 11'7	8 16'0	
Sun.	11	17 24	59'8	41'49	15 51'65	0'281	16 12'0	9 9'4	
Mon.	12	17 41	26'5	40'73	15 44'49	0'316	16 12'2	10 5'3	
Tues.	13	17 57	34'8	39'95	15 36'49	0'351	16 12'4	11 3'9	
Wed.	14	18 13	24'3	39'16	15 27'64	0'386	16 12'6	12 4'8	
Thur.	15	18 28	54'6	38'36	15 17'94	0'422	16 12'9	13 6'8	
Frid.	16	18 44	5'4	37'54	15 7'39	0'457	16 13'1	14 8'0	
Sat.	17	18 58	56'3	36'70	14 56'00	0'493	16 13'3	15 6'8	
Sun.	18	19 13	26'9	35'85	14 43'75	0'528	16 13'5	16 2'1	
Mon.	19	19 27	36'8	34'98	14 30'66	0'563	16 13'7	16 53'6	
Tues.	20	19 41	25'7	34'09	14 15'73	0'598	16 13'8	17 41'9	
Wed.	21	19 54	53'2	33'19	14 1'97	0'632	16 14'0	18 27'4	
Thur.	22	20 7	58'9	32'27	13 46'39	0'666	16 14'2	19 11'1	
Frid.	23	20 20	42'4	31'34	13 30'00	0'700	16 14'4	19 53'9	
Sat.	24	20 33	3'4	30'40	13 12'81	0'733	16 14'6	20 36'5	
Sun.	25	20 45	1'5	29'44	12 54'84	0'765	16 14'7	21 19'7	
Mon.	26	20 56	36'4	28'46	12 36'09	0'797	16 14'9	22 3'9	
Tues.	27	21 7	47'8	27'48	12 16'60	0'828	16 15'1	22 49'5	
Wed.	28	21 18	35'3	26'48	11 56'37	0'858	16 15'3	23 36'5	
Thur.	29	21 28	58'6	25'46	11 35'43	0'887	16 15'4	* * *	
Frid.	30	21 38	57'4	24'44	11 13'80	0'915	16 15'6	0 24'8	

PHASES OF THE MOON.

h	m	h	m
12	44	..	..
4	37	..	..
1	43	..	..
6	54	..	..
7	24	..	..
14	21	..	..
21	20	..	..
29	19	..	..
November 7	14	Perigee	..
November 13	26	Apogee	..
November 13	26	Apogee	..

DECEMBER, 1883.

Day of the Week.	Day of the Month.	AT APPARENT NOON				Equation of Time to be subd. from		Semi-diameter.	THE MOON'S Meridian Passage.
		THE SUN'S				added to			
		Apparent Declination.	Var. in hour.	h	m	Var. in One Hour.	h			m
Sat.	1	S 21 48	31'5	23'10	10 51'51	0'942	16 15'7	1 14'0	
Sun.	2	21 57	40'5	22'35	10 28'58	0'968	16 15'9	2 3'6	
Mon.	3	22 6	24'1	21'28	10 5'03	0'993	16 16'0	2 53'0	
Tues.	4	22 14	42'0	20'21	9 40'90	1'017	16 16'2	3 42'0	
Wed.	5	22 22	34'0	19'12	9 16'22	1'040	16 16'3	4 30'6	
Thur.	6	22 29	59'9	18'03	8 51'00	1'061	16 16'5	5 19'2	
Frid.	7	22 36	59'5	16'93	8 25'28	1'081	16 16'6	6 8'3	
Sat.	8	22 43	32'4	15'81	7 59'09	1'101	16 16'7	6 58'7	
Sun.	9	22 49	38'4	14'69	7 32'45	1'119	16 16'8	7 51'2	
Mon.	10	22 55	17'4	13'56	7 5'39	1'136	16 17'0	8 46'3	
Tues.	11	23 0	29'2	12'42	6 37'94	1'152	16 17'1	9 44'4	
Wed.	12	23 5	13'7	11'28	6 10'11	1'167	16 17'2	10 44'9	
Thur.	13	23 9	30'6	10'13	5 41'93	1'181	16 17'3	11 46'5	
Frid.	14	23 13	19'9	8'98	5 13'44	1'193	16 17'4	12 47'6	
Sat.	15	23 16	41'5	7'82	4 44'66	1'205	16 17'5	13 46'2	
Sun.	16	23 19	35'1	6'65	4 15'61	1'215	16 17'5	14 41'3	
Mon.	17	23 22	0'7	5'48	3 46'34	1'224	16 17'6	15 32'8	
Tues.	18	23 25	58'2	4'31	3 16'85	1'232	16 17'7	16 20'9	
Wed.	19	23 25	27'5	3'13	2 47'21	1'238	16 17'7	17 6'5	
Thur.	20	23 26	28'5	1'95	2 17'42	1'244	16 17'8	17 50'4	
Frid.	21	23 27	1'3	0'78	1 47'52	1'247	16 17'9	18 33'5	
Sat.	22	23 27	5'8	0'40	1 17'55	1'250	16 17'9	19 16'6	
Sun.	23	23 26	41'9	1'59	0 47'54	1'250	16 18'0	20 0'3	
Mon.	24	23 25	49'7	2'76	0 17'53	1'250	16 18'0	20 45'3	
Tues.	25	23 24	29'2	3'94	0 12'45	1'248	16 18'0	21 31'7	
Wed.	26	23 22	40'4	5'12	0 42'36	1'244	16 18'1	22 19'7	
Thur.	27	23 20	23'4	6'20	1 12'16	1'239	16 18'1	23 9'0	
Frid.	28	23 17	38'3	7'46	1 41'82	1'232	16 18'1	23 59'0	
Sat.	29	23 14	25'1	8'63	2 11'30	1'224	16 18'1	* * *	
Sun.	30	23 10	44'0	9'79	2 40'56	1'214	16 18'2	0 49'3	
Mon.	31	23 6	35'0	10'95	3 9'56	1'202	16 18'2	1 39'3	

PHASES OF THE MOON.

h	m	h	m
23	46	..	..
15	28	..	..
20	84	..	..
0	50	..	..
December 13	16	Perigee	..
December 12	24	Apogee	..
December 12	24	Apogee	..

TABLE OF FIXED STARS FOR FINDING THE LATITUDE.

THE following is a list of names, &c., of a few of the stars likely to be most useful for those who traverse the region treated of in this book, beginning with "Orion," as being a well known constellation.

Constellation and Name.	Magni- tude.	Right Ascension.		Amount Varia- tion.	Declination.	Amount Varia- tion.	Position.	
		h. m. s.	sec.					° ' "
α Orionis — Be- telgeux ...	1'2	5	48	44	+3'2	7 23 0N	+ 1'0	} On each side of Belt near Cel. Equator
β Orionis—Rigel	1	5	8	49	+2'9	8 20 26S	+ 4'4	
α Canis majoris —Sirius ...	1	6	39	54	+2'6	16 33 14S	- 4'7	20° S.E. of Belt
α Canis minoris —Procyon ...	1	7	33	4	+3'1	5 31 42N	- 9'0	25° N.E. of Sirius and East of Betelgeux
α Geminorum — Castor ...	2'1	7	27	0	+3'8	32 8 53N	- 7'5	In line with Rigel and middle of Belt
β Geminorum — Pollux ...	1'2	7	38	2	+3'7	28 18 44N	- 8'4	5° S.E. of Castor
α Leonis—Regu- lus ...	1'2	10	2	2	+3'2	12 32 54N	+ 17'4	37° from Procyon, and in line with it and S. star of Belt
α Tauri — Alde- baran ...	1	4	29	6	+3'4	16 16 7N	+ 7'6	14° S.E. by E. from Pleiades
α Bootis—Arctur- us ...	1	14	10	14	+2'7	19 48 11N	- 18'8	60° E.N.E. from Re- gulus
α Virginis—Spica ...	1	13	18	55	+3'2	10 32 23S	- 18'9	33° S.S.W. of Arcturus
α Scorpii — An- tares ...	1'2	16	22	7	+3'7	26 9 59S	- 8'3	46° from Spica, in line with Regulus
α Crucis (South- ern Cross) ...	1	12	20	0	+3'3	62 26 22S	- 20'0	In foot of Cross
β Centauri } Pointers to } α Crucis }	1	13	55	26	+4'2	59 47 53S	- 17'6	12° E.N.E. of α Crucis
α Centauri }	1	14	31	31	+4'0	60 20 43S	- 15'4	5° E. of β Centauri
α Aquilæ — Al- tair ...	1'2	19	44	59	+2'9	8 33 18N	+ 9'2	60° N.E. by E. of An- tares

N.B.—The above positions are for 1st January, 1881.

It is presumed that the simple rule for finding what stars are near the Meridian is generally known. The following may be found useful in practice:— Any object whose Declination is equal to, and of same name as the Latitude, will cross the Meridian in the Zenith; if the Declination is greater than the Latitude the star will be found N. or S. of observer, according as the Declination is N. or S. To set the sextant to the approximate altitude of star, if the Latitude by D.R. and Declination are of different names their *sum* is equal to the Zenith Distance; if they are of the same name, their *diff.* is equal to Zenith Distance; and the Zenith Distance taken from 90° gives the approximate altitude required.

Louisiade Archipelago.

Two Islets S.W. of East Island. Consider these to be placed too far to the Southward, the Line by 5th - the W by 2 miles. Nos. 2123 and 2764. (Charts)

Shoal 7 fms. $10^{\circ} 36' 50'' S$; $151^{\circ} 35' 30'' E$ from Chart. Bearings - Hastings Islands N. $38\frac{1}{2}^{\circ}$. Dawson Island N. 43 W. Hummock Island. S $82^{\circ} W$. Extensive Reef.

Teke Island. NE. Island. NNW. West Island. N. $82^{\circ} W$. Nos. 2123 and 2764^(C). Anchorage off S. Side. 14 fms. - coral mud bottom. Tides run in NNE and S. S. W direction about 4 knots.

Thereof off the Island extend further to the East than shown on the Chart. A missionary teacher resides at East Island who speaks a little English.

Mewstone Island. Anchor bearings:

Mewstone. N $58^{\circ} E$; N. $69^{\circ} W$. 2124 (Chart) Good anchorage on South Side of Island in 15 fathoms (coral sand) about a mile from shore. The reefs in the Bay extend for more than half that distance from the latter.

Shoal. $11^{\circ} 8' S$. $152^{\circ} 33' 30'' E$ (2124 Chart) $\frac{1}{2}$ mile in extent and from its appearance probably has 3 to 4 fms in it.

N.S. N. Gormint Gazette
Feb 17 81

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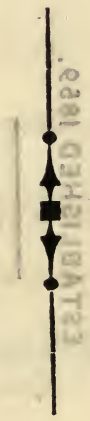
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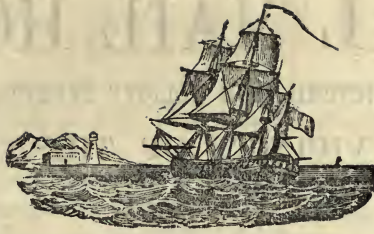
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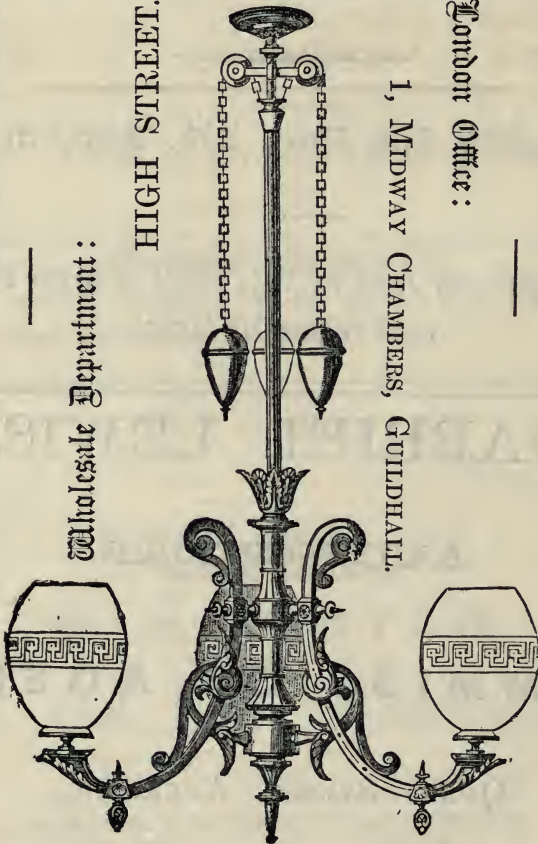
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Iron and Steel Merchants,

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The Union Bank of Australia,

LIMITED.

<i>Paid-up Capital</i>	-	-	-	-	£1,500,000
<i>Reserve Funds</i>	-	-	-	-	816,500
					£2,316,500
<i>Reserve Liability of Proprietors</i>	-	-	-	-	3,000,000
<i>Total Capital and Reserve Funds</i>	-	-	-	-	£5,316,500

1 BANK BUILDINGS, LOTHBURY, LONDON.

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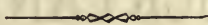
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The Bank grants Letters of Credit on demand, or Bills, at three or thirty days' sight, upon its branches, at the customary rates, on the money being deposited. Similar letters of Credit may be procured from its Agents in all the principal Towns throughout England, Scotland, and Ireland. The Bank also negotiates, and sends for collection, Bills on the Colonies, the terms for which may be obtained on application at its London Office. At its Branches in the Colonies it undertakes all descriptions of Banking and Exchange business.

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In fact, by its use the Most Malignant of Tropical Fevers have been ejected from the human system, and by its aid Dying, Fever-stricken Men have been, as it were, RAISED FROM THE DEAD.

A NEVER-FAILING REMEDY for all Skin Diseases, Rheumatism in all its forms, such as Gout, Neuralgia, Sciatica, and Lumbago; likewise cures Chronic Dysentery, and is a valuable remedy as a Family Medicine for Purifying and Cleansing the Blood.

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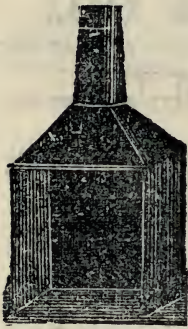
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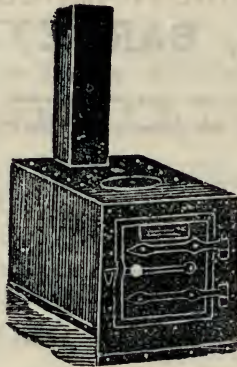
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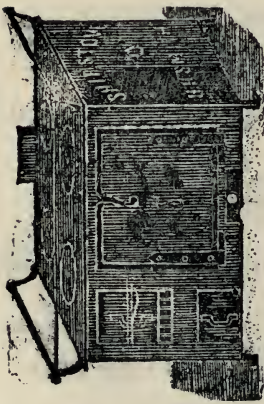
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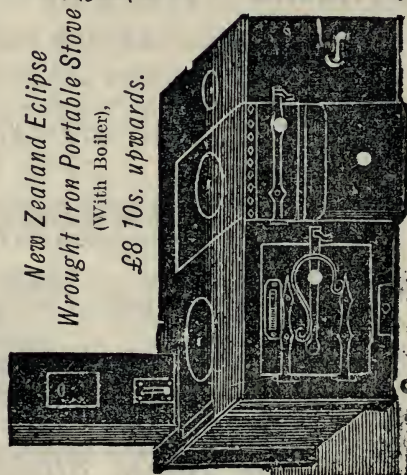
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W. I. TAYLOR, Esq. | J. C. FIRTH, Esq. | J. L. CAMPBELL, Esq.

Auditors :

G. B. OWEN, Esq. | . K. TAYLOR, Esq.

General Manager :

DAVID L. MURDOCH, Esq.

Inspector :

JOHN MURRAY, Esq.

Solicitors :

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Newcastle Branch—N.S.W.

In Fiji :

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Philadelphia, U.S.—Messrs. Drexel and Co.

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California—Bank of California, Bank of British Columbia, Bank of British North America, Anglo-Californian Bank.

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London, E C.

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In Sydney : E. B. Holt, Esq., Agent, 1, Queen-street.

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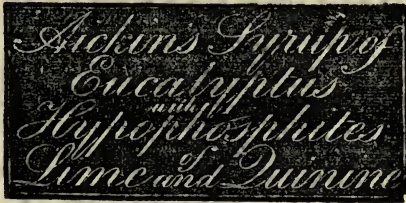
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EUCALYPTUS, OR BLUE GUM,

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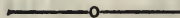
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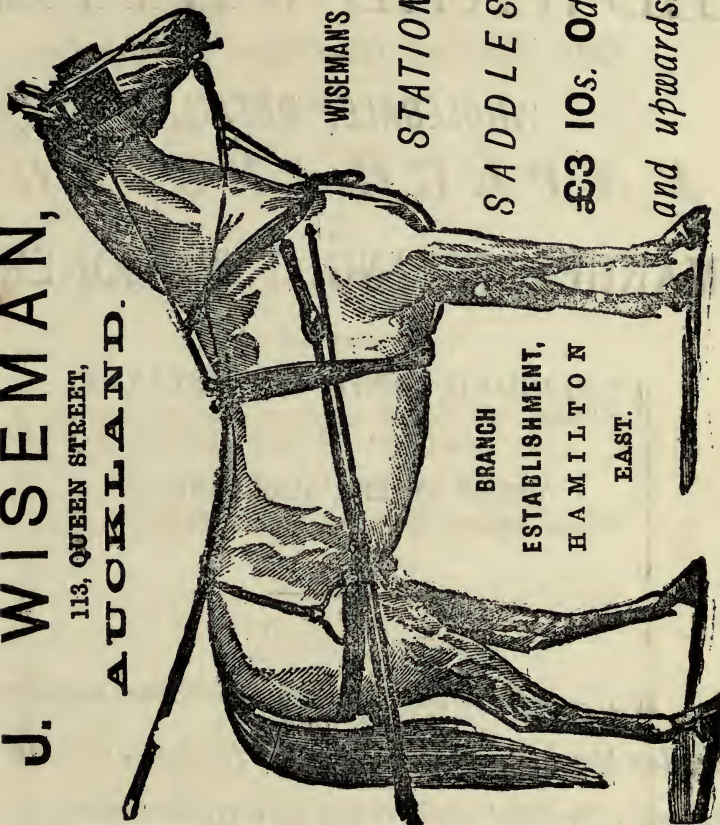
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